

EVERYMAN'S
ENCYCLOPÆDIA
IN TWELVE VOLUMES

VOLUME TWELVE
SYLVICULTURE—ZYMOTIC

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EVERYMAN'S ENCYCLOPAEDIA

VOLUME TWELVE

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SYLVICULTURE—ZYMOTIC

NOTE ON THE ADDENDA WHICH APPEARS ON PAGE 765

A number of biographical notices omitted from earlier volumes have been added here; and advantage has been taken of the additional space to supplement several entries by the mention of more recent developments and to include also a more detailed conspectus of English Art than fell within the scope of the general articles on ART and PAINTING.

LIST OF ABBREVIATIONS

ac., acres.	<i>i.e.</i> , that is.
A.D., after Christ.	in., inches.
agric., agricultural.	inhab., inhabitants.
ambas., ambassador.	Is., island, -s.
ann., annual.	It., Italian.
arron., arrondissement.	Jour., journal.
A.-S., Anglo-Saxon.	Lat., Latin.
A.V., Authorised Version.	lat., latitude.
b., born.	l. b., left bank.
B.C., before Christ.	long., longitude.
Biog. Dic., Biographical Dictionary.	m., miles.
bor., borough.	manuf., manufacture.
bp., birthplace.	mrkt. tn., market town.
C., Centigrade.	Mt., mts., mount, mountain,
c. (<i>circa</i>), about.	N., north; northern.
cap., capital.	N.T., New Testament.
cf., compare.	O.T., Old Testament.
co., county.	par., parish.
com., commune.	parl., parliamentary.
cub. ft., cubic feet.	pop., population.
d., died.	prin., principal.
Dan., Danish.	prov., province.
dept., department.	pub., published.
dist., district.	<i>q.v.</i> , which see.
div., division.	R., riv., river.
E., east; eastern.	r. b., right bank.
eccles., ecclesiastical.	Rom., Roman.
ed., edition; edited.	R.V., Revised Version.
<i>e.g.</i> , for example.	S., south; southern.
Ency. Brit., Encyclopædia Britannica.	sev., several.
Eng., English.	Sp., Spanish.
estab., established.	sp. gr., specific gravity.
<i>et seq.</i> , and the following.	sq. m., square miles.
F., Fahrenheit.	temp., temperature.
<i>fl.</i> , flourished.	ter., territory.
fort. tn., fortified town.	tn., town.
Fr., French.	trans., translated.
ft., feet.	trib., tributary.
Ger., German.	U.S.A., United States of America.
Gk., Greek.	vil., village.
gov., government.	vol., volume.
Heb., Hebrew.	W., west; western.
Hist., History.	yds., yards.

ENCYCLOPAEDIA

S

Sylviculture, *see* ARBORICULTURE and FORESTRY.

Sylvine, or **Sylvite**, a naturally occurring form of potassium chloride, found at Stassfurt in Prussia and round the fumaroles of Vesuvius. It crystallises in the cubic system, is white in colour and soluble in water (hardness 2, sp. gr. 1.9).

Sylvius, **Jacobus** (the Latinised name of Jacques Dubois) (1473-1555), a Fr. anatomist, began to lecture on anatomy at the Royal College, Paris, when he was already over fifty years old. His lectures were mere expositions of his master, Galen, and were only rarely enlightened by practical demonstrations from the human frame.

Symbiosis, or **Mutualism**, an intimate relationship between separate organisms, one of which may have been originally parasitic on the other, but by modification the two have become able to live together and derive mutual benefit from each other's presence. Each lichen is a combination of a fungus and one or more kinds of algæ, living in active partnership. *S.* exists between a fungus and certain rye-grasses, the mycelium being vegetatively perpetuated in the seed of the plant and not by spores. Infected plants are found to be more vigorous than uninfected ones. Leguminous plants and nodule bacteria are in symbiotic relationship, the latter supplying the roots of the plants with nitrogen, and in return receiving carbon and other necessary food elements.

Symbolism, the sign or representation of any moral or spiritual thing by the images or properties of natural or material things; or the assumption in external things of an inner spiritual meaning, *e.g.* the lion is the symbol of courage, the lamb of meekness or patience. Symbols themselves are of various kinds, as types,

enigmas, parables, fables, allegories, emblems, hieroglyphics, etc. Some closely approximate to or rather are readily suggestive of the inward significance with which they are invested, or the event of which they are the representation, while others, like the material objects of idolatry, are often either in no way apparently related to such significance or representation, or such connection as there may be is to be sought in some long-forgotten association of ideas, *e.g.* the tree-trunk which assists a savage to meditate on some divine conception merely because thousands of his ancestors having so regarded such symbol it has become sanctified with a halo of reverence. *S.* is also specifically applied to the system which invests the forms of Christian ritual, dogma, and the fabric and architecture of the churches with a symbolical meaning. In Christian theology every sacrament is an outward and visible sign of an inward and spiritual grace. The different churches vary in their views as to the nature of the reality which the symbolism represents. The full Catholic view is that the sacrament actually performs spiritually what it symbolises: at the other extreme are those who regard the sacraments as little more than *S.*

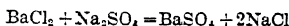
Symbolist, *l'Ecole*, a reactionary school of writers which arose against the Parnassians (*q.v.*). Its main object was the reproduction of forms and colours by the logical transcription of the idea. According to its originators poetry should translate the deepest secrets of the soul by means of symbols connecting the physical with the moral world. The originator was Alfred de Vigny, and its principal exponents were Baudelaire, Mallarmé, and Verlaine, and among the more recent Laforgue, Kahn, Verhaeren, Vièle, and Griffin. As an offshoot Moréas

founded the Rom. school. See A. Symons, *The Symbolist Movement in Literature*, 1899; P. Quennell, *Baudelaire and the Symbolists*, 1929.

Symbols. A symbol is a conventional or arbitrary sign, by means of which the writing of names in science is much simplified.

Chemical. Dalton was the first to introduce a reasonable system of chemical symbols. He represented the atoms of substances by means of circles, an atom of one substance being distinguished from that of another by some mark inside this circle. Thus a clear circle \bigcirc represented an atom of oxygen, \odot an atom of hydrogen, \bullet one of carbon, \oplus an atom of sulphur, and so on. He thought that water was the combination of one atom of oxygen with one of hydrogen; he therefore represented a molecule of water by $\odot \bigcirc$. His symbols were entirely superseded by those introduced by Berzelius. The symbol for an atom of an element is usually represented by the first letter of the name of the substance. Thus, carbon C, hydrogen H, oxygen O, etc. In some cases, where the names of several elements have the same initial letter, two letters are employed, thus chlorine Cl, copper Cu, cobalt Co. In some few cases the initial letter or letters of the Latin name is used, thus gold (aurum) Au, silver (argentum) Ag, and so on. It is known that two atoms of hydrogen combine with one of oxygen to form water. Thus H_2O represents a molecule of water and conveys the above information. In a similar manner a molecule of hydrogen is written H_2 , because it is known to contain two atoms. NH_3 stands for a molecule of ammonia, and implies that three atoms of hydrogen and one of nitrogen are combined. The symbols H, N, etc., stand also for the atomic weight in grams (g.w.) of the elements. Thus H_2 represents two grams of hydrogen, and NH_3 conveys the idea that fourteen grams of nitrogen are combined with three grams of hydrogen to form seventeen grams of ammonia. A similar symbol can be constructed for all compounds. If the symbols represent gases then we have also a volume relation, because the molecular weight in grams of a gas occupies 22.4 litres at 0°C . and 760 mm. pressure ('N.T.P.'). Thus, H_2 , N_2 , NH_3 can represent 22.4 litres of hydrogen, nitrogen, and ammonia respectively. Symbols are also employed to express chemical reactions, by means of equations. The symbols of the interacting substances are placed, with a plus sign in between, on the left-hand side of the equation.

On the right-hand side are placed the symbols of the substances formed, also with a plus sign in between. The equation



means that a molecule of barium chloride (BaCl_2) reacts with a molecule of sodium sulphate (Na_2SO_4) to give one molecule of barium sulphate (BaSO_4) and two molecules of sodium chloride (NaCl). Or that 208 grams of barium chloride interact with 142 grams of sodium sulphate to give 233 grams of barium sulphate and 117 grams of sodium chloride. If the interacting substances are gases, we have a relation between the volumes employed in addition to the gravitational relation above. Thus, $\text{H}_2 + \text{Cl}_2 = 2\text{HCl}$ means that one volume (22.4 litres) of hydrogen combines with one volume of chlorine to give two volumes (44.8 litres) of hydrochloric acid gas. In a similar manner interactions between gases and solids or liquids can be expressed either gravimetrically or volumetrically, or as a combination of the two.

Arithmetical. + (plus) means addition, positive; - (minus), subtraction; $+$ ^{ve}, positive; $-$ ^{ve}, negative; + and - stand for positive and negative in magnetism, electricity, or when referring to a direction; =, equality; three strokes (\equiv) means identically equal; \times , multiplied by; \div , divided

by; divided by is also expressed thus, $\frac{a}{b}$

a/b , i.e. a divided by b ; $\sqrt{\quad}$, square root; $\sqrt[n]{\quad}$, cube root; $\sqrt[n]{\quad}$, n^{th} root, and so on; a^n means a multiplied by itself

n times; $\sqrt[n]{a}$ means the n^{th} root of a .



$a^{-n} = \frac{1}{a^n}$, $a^0 = 1$; \therefore = therefore; \because = because. The expression $a : b :: c : d$ means that a is to b as c is to d , or $\frac{a}{b} = \frac{c}{d}$; \propto , varies as, e.g. $y \propto x$, y

varies as x ; $>$ greater than; \nless not greater than; $<$ less than; \nless not less than, e.g. $a > b$, a is greater than b ; \hookleftarrow the difference of, e.g. $x \hookleftarrow y$, difference of x and y ; $x \sim y$, x is similar to y ; \square , equal and similar; \square square; \square cms., square centimetres, also written sq. cms.; c.c., cubic centimetres; cm., centimetres; mm., millimetres; gm. grams; \pounds s. d., pounds, shillings, and pence. Feet and inches are written ' and " ; thus $5' 6'' \times 4' 3''$ means 5 feet 6 inches by 4 feet 3 inches; ∞ , infinity, a quantity greater than any we can name. 0, zero. $n!$ or ! (factorial n) means $n(n-1)(n-2) \dots 1$. nC_r , combinations of n

things r at a time; "P, permutations of n things r at a time; $\{ \} ()$ —, brackets; Σ , the algebraic sum of; a, b, c , etc., usually denote constants, and x, y, z , variables.

Geometrical. \square , square; \square' , square inches; \square'' , square feet. Length is denoted usually by L or l , area by A or a , volume by V or v , radius by R or r , diameter by D or d , radius of curvature by ρ , angle ABC by $\angle ABC$ or $\angle ABC$; \perp , right angles; \perp or \perp' , at right angles or perpendicular to; \parallel parallel; $\not\parallel$ not parallel; \square

rectangle; \bigcirc circle; \langle parabola;

 ellipse;  hyper-

bola; R.H., rectangular hyperbola; \square , or \square^m , parallelogram; \square , piped, parallelepiped.

Calculus. $f(x)$, $F(x)$, $\phi(x)$, $\psi(x)$, etc., functions of x ; $f(x, y)$, $F(x, y)$, etc., functions of x and y ; $f^{-1}(x)$, $F^{-1}(x)$, etc., inverse functions of x and y ; D , differentiation; $\frac{d}{dx}$, differentiation with respect to x . Thus $\frac{dy}{dx}$, differentiation of y with respect to x ;

$\frac{d^ny}{dx^n}$, y differentiated n times with respect to x ; δ , increment, thus δx is the increment of x ; $\frac{\partial}{\partial x}$, partial

differentiation; \int or D^{-1} , integrate. In Newton's fluxional notation \dot{x} means differentiate x with respect to time; \ddot{x} differentiate twice, and so on.


Trigonometrical. $P(x, y)$, the co-ordinates of point P are x and y . \sin , \cos , \tan , etc., are abbreviations of the circular functions sine, cosine, tangent, etc. $50^\circ 40' 24''$ means an angle 50 degrees 40 minutes 24 seconds (see TRIGONOMETRY). π 3.14159, approximately ratio of circumference of a \bigcirc to its diameter; \sin^{-1} , \cos^{-1} , inverse of sine, cosine, thus if $\theta = \sin^{-1} x$, $\sin \theta = x$. The sides of a triangle ABC are usually denoted by a, b, c , a being opposite A , and so on. An angle is often denoted by $\theta, \phi, \psi, \alpha, \beta$, etc. \log , logarithm; e , the base of the napierian or hyperbolic logarithms.


Mechanical. C.G.S., centimetre-gramme-second system; F.P.S. or ft. lb. sec., foot-pound-second system; g , value of gravitational acceleration; M, m , mass; V, v , velocity; a, f , acceleration; V , volume; A , area; W , weight; w , weight of unit mass; K.E. or T, kinetic energy;

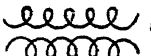
V , potential energy; ft. lbs., foot-pounds in work; lb.-feet, pound-feet in momentum; T, t , time; F , force; T , tension; p , pressure; ω , angular velocity; ρ , volume density; σ , surface density; λ , line density; E , Young's modulus; N , rigidity modulus; n , number of; I , moment of inertia; T.M., twisting moment; B.M., bending moment; Q , quantity; H.P., horse-power.

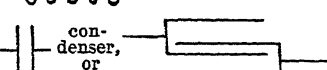
Physical. t° , temperature in degrees; J , Joules' equivalent; F°, C° , degrees Fahrenheit and centigrade respectively.

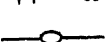
Electrical. x, y, z , etc., current. C , continuous current in amperes; C_e, C_a , external and armature current; R , resistance in ohms; R_a, R_e , resistance of armature and shunt; ρ , specific resistance; E.M.F., electromotive force, or simply E , also in volts; I , maximum alternating current; i , effective alternating current. L, M , coefficients of self and mutual inductions; ω , impedance; ω , ohm; Ω , megohm; K, k , capacity or specific inductive capacity; mfd , microfarad; Q, q , quantity of electricity; z , electrochemical equivalent; η , cell; III , battery of three cells in series; F.M., field magnet.

 inductive resistance;

 non-inductive resistance;

 alternating current transformer;

 condenser, or

 glow lamp;

 arc lamp.

Pw , power in watts; WJ , work in Joules; G , galvanometer; s , shunt; A , ammeter; V , voltmeter; n , number of turns of wire; \sim , alternations per second; B.T.U., Board of Trade units; B.Th.U., British thermal units.

Magnetic. N, S , north and south poles of a magnet; m , strength of pole; l , distance between poles; M , magnetic moment; H , strength of magnetic field; I , intensity of magnetisation; B , magnetic induction; K , magnetic susceptibility; μ , magnetic permeability; M.M.F., magneto-motive force.

Syme, James (1799-1870), a Scottish surgeon, was a contentious spirit, who nevertheless impressed his contemporaries with the driving force of his will and with his excep-

tional abilities as a teacher. For four years (1829-33) he supervised a hospital of his own in Edinburgh, connected with which was a clinical school, and in 1833 he accepted the chair of clinical surgery in the university of that town. He wrote *Principles of Surgery*, 1832, etc.

Symmachus, Quintus Aurelius (c. A.D. 345-410), a Rom. statesman, cherished, like Cicero, a deep veneration for the past. The letter which, as prefect of the city (384), he addressed to Valentinian II., urging him to restore the altar of Victory, is still extant.

Symmetry, in an artistic or geometric design, is said to exist with respect to some point of the figure or to some straight line within it. The two ends of a straight line, for example, are symmetric with respect to the mid-point of that line. Similarly a parallelogram is symmetric with respect to the point of intersection of its diagonals. With respect to a straight line (an axis), the two points outside that axis are symmetric with respect to the axis if the straight line between them bisects the axis perpendicularly. In another instance, two separate figures may be symmetric with respect to a point outside if corresponding distances from that point are proportional. In art and material objects the term S. is commonly used to denote shapes approximating to those of mathematical S.

Symonds, John Addington (1840-93), an Eng. man of letters, spent his life, like R. L. Stevenson, in combating the demon of ill-health, and like Stevenson again was never happy unless working at a fever heat. He, too, moreover, was obliged to elude the rigours of an Eng. climate, finding a happy refuge in Davos Platz—as he describes so charmingly in *Our Life in the Swiss Highlands* (1891). His critical biographies of Shelley (1878), Sir Philip Sidney (1886), and Michelangelo (1893) are true literature, and his *Autobiography of Benvenuto Cellini* (1887) exhibits his admirable gifts as a translator. Besides poems, S. wrote essays on Dante (1872) and the Gk. poets (1873-76). See biography by H. F. Brown, 1895.

Symons, Arthur (b. 1865), a poet and critic, b. in Wales. In 1889 he published a book of verses, *Days and Nights*, which was favourably reviewed by Walter Pater in the *Pall Mall Gazette*. His next two volumes of poetry, *Silhouettes* and *London Nights*, evinced the influence of Verlaine, with whom he had meanwhile formed a friendship; since then S. has produced many works, notably

Aubrey Beardsley, 1897; *The Symbolist Movement in Literature*, 1899; *Cities*, 1903; *Plays, Acting, and Music*, 1903; *Studies in Prose and Verse*, 1904; *Cities*, 1905; *Studies in Seven Arts*, 1906; *Cities of Italy*, 1907; *Knave of Hearts*, 1913; *Figures of Several Centuries*, 1915; *Tragedies*, 1916; *Tristan and Iseult*, 1917; *Studies in Elizabethan Drama*, 1920; *Chas. Baudelaire*, 1921; *Confessions*, 1930; *Wanderings*, 1931.

Symons, George James (1838-1900), a famous meteorologist, founder of the British rainfall organisation, and the first to keep records of the rainfall of Great Britain. In 1856 he entered the Meteorological Society, and in 1857 he was appointed a reporter to the Registrar General, and later worked under Admiral Fitzroy, who was researching on storm warnings on behalf of the meteorological department of the Board of Trade. His first volume, *British Rainfall*, appeared in 1860, and in 1866 he launched *Symons' Monthly Meteorological Magazine*.

Sympathetic Inks, see INK.

Sympathetic Nerves, see NERVOUS SYSTEM.

Sympathy (from Gk. *σύν* together, *πάθος*, feeling), or Fellow-feeling, in a human is an emotional state caused by intense consciousness of the sufferings, feelings, hopes, and pleasures of another living creature. Organic S. is primarily physical and inherited, showing itself in a violent liking for some particular thing (thus being the opposite of antipathy), or in an innate understanding, as e.g. of wild animals. Reflective S., though originating in primitive emotion caused at the sight or thought of another's condition, is critical and may be developed for the good of society. See EMOTIONS and FEELINGS.

Symphonic Poem, is a form of musical composition intended for a large orchestra, and which differs from the magnum opus of the past in that it is not composed of a number of more or less contained movements, but moves continuously from beginning to end, developing a theme which is capable of being translated into literature. It is sometimes accompanied by a written exposition of the theme. It is comparatively new as a musical form, and is therefore subjected to criticism by those who contend that pure music needs no assistance from literature, and therefore must lose its essential spirit when allied to literary interpretation. Perhaps the first efforts of this kind of orchestral music are those of Liszt. They are to be found most clearly defined in his 'Symphonische Dichtungen.' Later Richard Strauss adopted

this form of composition, a notable example being his *Tod und Verklarung*. It is acknowledged that this form of composition is capable of much development, but, like all new forms of art, it must withstand the suspicion which is usually directed against forms which have not yet matured. It is recognised, however, that the symphonic poem may possibly become the greatest form of musical composition and reach the climax of musical achievement, much in the manner of the development of the sonata.

Symphony, a composition, usually of four movements, in sonata-form, for orchestra. The term 'sinfonia', originally signified the prelude to an opera, but as a definite and distinct form the instrumental sonata or S. was established by Haydn and perfected by Mozart and Beethoven. The movements are usually (1) an allegro in sonata form; (2) a slow movement; (3) a scherzo, or, with Beethoven, a minuet, and (4) an allegro or presto, in rondo form, or occasionally in sonata form. This order is observed in classical Ss., but modern works are often entirely different; in some cases, e.g. Liszt and Elgar, movements follow without a break, as in Beethoven's C-minor (last two movements). The principal symphonists since Beethoven, including those who use the symphonic-poem form, are Schubert, Brahms, Liszt, Tchaikovsky, R. Strauss, Dvořák, Parry, Elgar, Mahler, and Bax. See SONATA.

Symposium (Gk. *συμπόσιον*), a Gk. drinking party. The title was used by both Plato and Xenophon for books describing the conversations of Socrates and others, and hence the term has changed its meaning to that of a conference or general discussion; also used to signify a collection of opinions on a given subject by various contributors.

Synagogue (Gk. *συναγωγή*, an assembly), a word used to denote either the congregation or the place itself in which Jewish communities meet together for public worship. The origin of the S. is obscure. From the earliest times, however, some special local assemblies seem to have been needed in addition to the Tabernacle and Temple services. Something of the same kind is indicated in Is. viii. 16. The true development of the S., however, dates from the days of Ezra's reformatations, from which time every Jew was expected to be acquainted with the Law. The conduct of the S. was in the hands of ten lay 'rulers.' The chief services were on the Sabbath morning.

Syncope (from the Gk. *συγκοπή*, a

cutting short, from *κοπῶ*, I cut), a grammatical term denoting the elision or non-pronunciation of a letter in the middle of a word, as, for example, of the 'e' in 'heav'n', and of the 'v' in 'e'er.' See FAINTING for another meaning of the term.

Syncretism (Gk. *συνκρητισμός*, union against a common enemy), in philosophy and theology, the tendency to unite in one the chief points of various different systems having some common basis. The term is specially used to denote a scheme advocated in the seventeenth century by Calixtus for the reunion of Rom. Catholics and the various Protestant bodies.

Syndic (Gk. *σύν*, together, and *δικη*, justice), in ancient Greece, an advocate in a court of justice. In the Rom. digest it means an attorney or agent for a *universitas* or corporate body; in which sense Gaius uses it as a synonym for *actor*. In the Middle Ages, *Syndicus* meant the agent or factor appointed by corporations to manage their common affairs, though more especially to represent them in law courts. On the Continent, S. meant a gov. official invested with different powers in different countries, or a kind of magistrate entrusted with the affairs of a city or community. In Geneva the S. was the chief magistrate. Almost all the companies in Paris had their Ss. Ss. still exist in Cambridge Univ., their chief duty being to regulate fees.

Syndicalism. The word is derived from the Fr. *Syndicat*. In France, where S. originated, a syndicate does not mean, as in Eng., a trading company, but an organisation of working men. S. is somewhat akin to the Industrial Unionist movement in the U.S.A., but is best suited to European continental conditions, and flourishes most in the Romance countries. Georges Sorel was the chief exponent of S. in France, and among other prominent teachers of Syndicalist theories were the Italians, Labriola and Leone.

Modern social theories start with an examination of the claims of different candidates to the ownership and control of industry. These are: (1) the present owners, i.e. the private capitalists; (2) the state; and (3) the workers in the industry. The social system representative of the first is Capitalism; of the second, Socialism; of the third, Syndicalism. Joint ownership is possible between any two of these groups, and for the different social theories based on these partnerships the reader is referred to the article SOCIALISM. But S. *sans phrase* stands

for the unfettered ownership and control of industry by the workers' trade unions—known in France as Bourses du Travail—linked in a loose national federation. The mines would belong to the miners, the railways to the railway workers, and so forth, and each union would make its contract with others. Thus the miners' union would arrange to supply the coal necessary to work the railways, in return for which the railway union would carry the coal got by the miners. A council of representatives from all the unions would administer national concerns, but for the rest *laissez-faire* would be the ruling idea. A central parliament, with representatives from geographical dists. as now, is opposed to the Syndicalist scheme of things. It will thus be seen that S. is a sort of group Anarchism (*q.v.*), and orthodox (or Marxian) Socialists have not hesitated to denounce S. as sheer anarchism—since organised sabotage, both violent and non-violent, is a part of its expression of revolt. Syndicalist leaders retort that S. is a true child of Marx, and that if the father of modern Socialism were alive to-day he would denounce as reactionary the present Socialist leaders. Nevertheless, the Syndicalist movement, according to Professor Laidler, has had a stimulating influence upon Socialist thought and has led to the development of a new school of Socialist doctrine, Guild Socialism (*see* SOCIALISM), which compromises between the former Socialism and S. In France the Great War caused an eclipse of the movement, and even Hervé, the violent anti-patriot, became oblivious to S. in the face of war. A cleavage resulted, and a minority bitterly resented the action of many of its leaders in taking an active part in the War; a cleavage which helped still further to weaken the movement, many of whose ablest exponents left to join the ranks of the Communists.

S. made its appearance in Britain towards the end of the first decade of this century, but the general public was first made aware of its existence by the series of widespread strikes in the year 1911. In 1912 a number of prosecutions and convictions of Eng. Syndicalists for attempting to seduce soldiers from obedience to their officers when called upon to fire in cases of riots arising from trade disputes revealed the anti-militarist nature of Syndicalist propaganda (*see* HERVÉ, G.). Messrs. Tom Mann, Guy Bowman, and Gaylord Wilshire were leading Eng. Syndicalists; but in England, as in France, the movement lost both influence and members as a result

of the Great War, though in this country S. can be said never to have received the widespread support it enjoyed in France, owing, it is claimed by some writers, to a difference in racial psychology. It is probable that the weakness of S. lies in its emphasis on man the producer and its tendency to overlook his social needs as a consumer. The first international Syndicalist Conference was held in London in the autumn of 1913.

Beatrice and Sidney Webb's *What Syndicalism Means* contains a short list of books and periodicals. The following may be mentioned here: Louis Levine, *The Labour Movement in France, a Study in Revolutionary Syndicalism*; A. D. Lewis, *Syndicalism and the General Strike*; W. Sombart, *Socialism and the Social Movement*; G. Sorel, *Reflections on Violence*, and his *Decomposition of Marxism*; and the Utopian romance by E. Pataud and Emile Pouget, *How We Will Make the Revolution*. Sir Arthur Clay's *Syndicalism and Labour* is a general adverse criticism, and Lord Snowden and J. R. MacDonald have written criticisms from the Socialist point of view. Brissenden, *A Study in American Syndicalism*, 1919; Jouhaux, *Le Syndicalisme et la C. G. T.*, 1920; Hunter, *Violence and the Labour Movement*, 1919; Laidler, *History of Socialist Thought*, 1927.

Syndicate, a partnership formed to carry out some one special financial or industrial project or enterprise, as, for example, to purchase the Crystal Palace, to erect a monument, or to float a company. In the absence of express stipulation to the contrary, such a partnership legally continues only up to the termination of the adventure which is the subject of the partnership. Similarly in the case of joint-stock companies under the Companies Consolidation Act, 1908, if the main object of a company is gone, the company must be wound up. This may be illustrated by the case of the *Amalgamated Syndicate* (1897); the company was formed to erect stands and let out seats for the Diamond Jubilee procession. The memorandum of association contained the usual comprehensive powers, among which were: (1) to carry on all manner of promotion business; and (2) to act as house agents. After the Jubilee, the S. having incurred a heavy loss, the directors proposed to carry on business under the above-specified powers, but the court held that the substratum having gone, the company must be wound up; and the enumeration of powers was read by the court not as a succession of objects different from the main object, but as general

powers merely providing for the execution by the company of matters which are only incidental to its main objects. In connection with joint-stock companies it need hardly be said that the formation of a S. is the customary mode of setting about the flotation of a company; in which sense it is further to be noted that a S. is generally itself an incorporated company which, having acquired a certain undertaking, sells it to another company at a profit, taking either cash or shares or both in exchange, the directors and promoters of the preliminary company or S., as a rule, becoming large shareholders and directors of the new company.

Synesius (c. 370-c. 414), bishop of Ptolemais in the Libyan Pentapolis, was a native of Cyrene in Africa. At Alexandria he attended the mathematical and philosophical lectures of the great Hypatia. A convert to Christianity, he was loth to accept his bishopric, and was actually allowed by the compliant Theophilus to keep the wife he dearly loved. His 146 letters are of intense interest, and there is much to divert the scholar in his treatises on *The Praise of Baldness*, on *Dreams*, and on *Self-Discipline*.

Synge, John Millington (1871-1909), a dramatist, b. at Rathfarnham, co. Galway; educated at Trinity College, Dublin, 1888-92. He studied music in Germany (1893) and literary criticism in Paris (1895), where he



JOHN MILLINGTON SYNGE

was 'discovered' by Yeats (1899) and persuaded to identify himself with the so-called 'Celtic Renaissance' movement. His writings include: *Playboy of the Western World*, *Well of the Saints*, *Shadow of the Glen*, *Deirdre*, *Tinker's Wedding*, *Riders to the Sea* (plays); *In Wicklow and*

West Kerry, *The Aran Islands* (prose); and *Poems and Translations*. See critical Lives by F. Bickley (1912) and P. P. Howe (1912).

Synonym (Lat. *synonymum*: Gk. *syn*, together, *onyma*, name), the term applied to a word which has the same or almost the same meaning as another word, or to a pair of words with the same meaning, illustrated by the words 'begin' and 'commence.' There is often, however, a slight difference, which sometimes becomes greater, so that the terms eventually lose their synonymous force.

Synovial Membrane, a membrane covering the articular extremities of bones and the inner surface of ligaments entering into the formation of a joint. It secretes a clear lubricating fluid with an alkaline reaction. *Synovitis* is inflammation of the synovial membrane: it may lead to ankylosis or stiffening of the joint.

Syntipas. This is the title of a collection of stories, written in Gk., and bearing the name of Michael Andreopoulos, but the collection is evidently translated from an Oriental work. Many of the stories of S. are found almost verbatim in an Arabic manuscript of the *Arabian Nights* in the British Museum, but the whole style of the stories points evidently to an Indian origin.

Syphax, a Numidian warrior, was king of the Massylians, but before 204 B.C. had defeated Masinissa and made himself master of the Massylian kingdom. At first a dangerous enemy to the Carthaginians, he finally threw in his fortunes with their leader, Hasdrubal—influenced, it is said, by Hasdrubal's daughter, Sophonisba, whom he married. Eventually he d. a Rom. captive after Scipio had destroyed his camp and troops by fire near Utica (203 B.C.).

Syphilis, a chronic infectious disease generally contracted during sexual intercourse. It is contagious until the tertiary stage is reached. The origin of this disease is rather uncertain, but there are grounds for believing that it was introduced into Europe by Columbus's sailors who had contracted it at St. Domingo. Other names under which it has been known are the 'Neapolitan disease' and the 'Fr. disease.' At the end of the fifteenth century it spread through Europe in the form of a great epidemic. It is characterised by various structural lesions, the most distinctive of which are the chancre, the mucous patch, and the gumma. A parasite (*Spirochaeta pallida*), present in the lesions, is accepted as the cause. Being generally a sexual matter, the most common situation for its appear.

ance is the genital organs, but the germ may enter any abraded surface on the body. An abraded surface, however, is *not* essential, as the virus can easily penetrate the delicate, soft, and moist mucous surfaces upon which chancres are commonly found. The earliest manifestation of acquired S. is the chancre or primary sore which appears between two and six weeks after the disease is first contracted. It usually takes the form of a reddish-brown pimple with an ulcerated summit and an indurated base which, when pressed between the finger and thumb, has a cartilaginous feeling. Following the appearance of the chancre, the nearest lymphatic glands swell and become hard. The mucous patch is formed upon mucous membranes or in situations where two skin surfaces are constantly in contact. It is a slightly elevated patch, usually covered by a thin whitish membrane. The gumma is a rounded tumour of varying size. Its usual situations are the periosteum of flat bones, the membranes of the brain, the testicle, liver, and spleen. It contains a gummy material and is generally soft to the touch.

There are three stages in the course of the disease: (1) the primary (*primary S.*), distinguished by the presence of the chancre; (2) the secondary (*secondary S.*), by the mucous patch, sore throat, and swelling of the glands; and (3) the tertiary (*tertiary S.*), by the gumma and skin lesions. A period of six to nine weeks intervenes between the appearance of primary S. and that of secondary S. No definite time can be fixed for tertiary S., as it is extremely variable. S. other than that acquired through sexual connection is known as *non-venereal* or *S. insontium* (S. of the innocent). Forms of non-venereal S. may be *congenital*, *hereditary*, *economica* (i.e. that form contracted by using contaminated materials, e.g. a towel formerly used by an affected person, and also by casual contact with a syphilitic), or *technica* (i.e. that form acquired by those attending on syphilitics, e.g. doctors, nurses, and midwives).

The general idea regarding S. seems to be that it is an incurable disease, usually proving fatal. In this connection Hutchison states: 'It would be absurd to speak of syphilis as in the main a bugbear, but the impression derived from my own experience as to its curability and remote results incline me to suspect that the gross exaggerations prevalent respecting it cause more misery than is produced by the disease itself.' This eminent authority further suggests that the popular estimate of its

prevalence is also grossly exaggerated.

As a cure for S. mercury and iodides have been used, but these have been superseded by a marvellous chemical compound discovered by Ehrlich with the assistance of S. Hata (of Tokyo) and at one time known as *Ehrlich-Hata*. This is dioxidyaminoarsenobenzoldihydrochloride, registered as *Salvarsan*, and commonly called '606.' The use of salvarsan has been attended with startling and almost miraculous effects. Ehrlich writes concerning the specific action of '606': 'With a sufficient dose spirochetes disappear in 24 to 48 hours; if longer, it is due to the dose being insufficient or being insufficiently absorbed.' Neo-salvarsan, known as 914, is easier to administer than salvarsan, and is now commonly used in conjunction with either mercury or bismuth preparations. General paralysis of the insane, due to S., is treated by the introduction into the system of benign malarial parasites. After several attacks of fever the malaria is treated by quinine.

A royal commission, under the chairmanship of Lord Sydenham, was appointed (Nov. 1913) to investigate the whole of the subject of the *hidden plague*—as it was called in the terms of reference, which were extremely wide. The appointment of this commission met with world-wide approval and interest, and Professor Ehrlich himself offered his services in connection with it. The necessity for thorough investigation was recognised by the fact that at the meetings of the Royal Society of Medicine in 1912 it was stated authoritatively that there were 40,000 cases at least in London only, and 130,000 in the United Kingdom. As has been pointed out, it is absolutely curable, but the grave danger consists in the fact that it is *contagious*, and can therefore—as has been shown in the course of this article—be acquired by perfectly innocent people, such as wives, students, dentists, and children, and may thus even be passed on to the descendants of such people. The difficulty lies, of course, in the fact that the whole subject has been banned from open discussion; and, because of the manner in which it is mainly acquired by, and is always associated with, illegitimate sexual intercourse, persons afflicted endeavour to conceal the fact; hence the name *hidden plague*. It would be easy to paint in glowing colours the terrors resulting from such conduct, but once it is recognised that by placing oneself absolutely under the control and direction of any responsible

and well-experienced medical man until he discharges the victim as cured, a large number of these terrors will disappear, and in time, it is confidently asserted by some authorities, the plague itself may be exterminated (at any rate, in non-tropical countries). It must be noted, however, that the doctor's instructions must be thoroughly carried out and his word taken as law, otherwise, as can be shown by the following example given in a prominent Eng. monthly periodical, the effects may be disastrous. A young man, it is assumed, becomes affected, and after the usual foolish delay, consults a medical man. Very soon the young man imagines himself cured, fails to visit his adviser, and ceases the course of treatment; although he has been told that the remedy takes at least a year. Naturally in the course of a few months the secondary symptoms appear and again he takes up the course, this time more seriously; but, as before, he again rejects the advice given him. Later, he marries, and again has to see his doctor. This time he has tertiary symptoms. In the meantime a child has been born and in a month or so shows the hereditary taint. The wife, until the child has been born, has shown no signs of contagion; but—and the importance of this cannot be too much insisted upon—she acquires S. from the foetus during parturition (unless, and this is very rare, she has been placed under treatment months before). This is quite sufficient to show the necessity for rigorous treatment of the scourge, for a changed attitude of mind towards it, and for more openness on the part of its victims. It will also show, as has been pointed out by Sir Jonathan Hutchison and powerfully reiterated by *Civis*, that the danger of the scourge 'in European countries is not the disease itself, but the neglect of the disease.'

It must not be assumed, however, that one can act with impunity and transgress the ordinary moral code of to-day as one is led by desire. Although Hutchison has formulated the following law of hereditary transmission, 'it is not the state of health of the parent that is transmissible, but the poison, thus the law of syphilitic transmission differs fundamentally from that of such diseases as gout and scrofula,' and although it follows from this that people who have been cured may marry and have perfectly healthy offspring, yet it is still, and always will be, not equally applicable to male and female. For an affected woman retains the germ much longer than a man, and it is extremely diffi-

cult to state with an absolute degree of accuracy when, in such cases, a cure has been effected. Candour on this question, and serious and intelligent study, will undoubtedly lessen its danger; and, more important still, may result in the uplifting of the general moral tone of future generations of young people, with a consequent growth of cleanliness of mind and body. The Great War undoubtedly led to the discovery and treatment of large numbers of cases. The establishment of local centres and of hospitals providing treatment, and the work of local authorities, in conjunction with the British Social Hygiene Council, have had remarkable results. In the years 1920-24 the numbers of syphilitic patients fell from 42,805 to 22,010. Consult Dennie, C. C., *Syphilis*; Harrison, L. W., *Modern Diagnosis and Treatment of Syphilis, Chancroid, and Gonorrhœa*; Hazen, H. H., *Syphilis*; Stokes, J. H., *Modern Clinical Syphilology*. See also GONORRHOEA.

Syra, or Syros (anct. Σύρος), an important island of the Gk. Cyclades in the Egean Sea, having an area of 55 sq. m. Since the loss of its forests it has become noted for its bare and rocky soil. In 1800 the inhabitants numbered some 1000, but after the settlement of Gk. refugees the island rapidly became populous. In spite of the competition of Piræus, the chief port, Hermupolis, which is the seat of a Rom. Catholic bishop as well as of the gov., is still a flourishing commercial entrepôt of the Levant, exporting sponges, emery stone, lemons, and valonia. Pop. about 35,000.

Syracuse: (1) (It., *Siracusa*). A fortified city and seaport, the cap. of the prov. of Syracuse, Sicily, is situated on the peninsula (formerly an island) of Ortygia, 81 m. S.W. of Messina. It has a cathedral, and other ecclesiastical edifices, the ruins of Gk. and Rom. temples, catacombs, aqueducts, an amphitheatre, and quarries which were formerly used as prisons. There are also the remains of a Gk. theatre and a museum of antiquities. There is trade in salt, wine, chemicals, pottery, olive oil, asphalt, almonds, oranges, and lemons. Pop. (1928) 55,780. In anct. times it was the wealthiest and most populous city in Sicily. It was founded in 734 B.C., one year after the foundation of Naxos, by a colony of Corinthians and other Dorians, led by Archias the Corinthian. At the time of its greatest prosperity S. had two harbours. The Great Harbour, still called Porto Maggiore, is a splendid bay about 5 m. in circumference, formed by the island of

Ortygia and the promontory known as Plemmyrium. The Small Harbour, also called Laccius, lying between Ortygia and Achradina, was capacious enough to receive a large fleet of ships of war. There were several stone quarries (*laulumia*) in S., which are frequently mentioned by anc. writers and in which the unfortunate Athenian prisoners were confined. The gov. of S. was originally an aristocracy and afterwards a democracy, until Gelon made himself tyrant or sovereign of S. in 485 B.C. Under his rule and that of his brother Hieron, S. was raised to an unexampled degree of wealth and prosperity. Hieron *d.* in 487 and was succeeded by his brother Thrasybulus; but the rapacity and cruelty of the latter soon provoked a revolt among his subjects, which led to his deposition and the establishment of a democratical form of gov. The next important event in the history of S. was the siege of the city by the Athenians, which ended in the total destruction of the great Athenian armament in 413. The democracy continued to exist in S. until 406, when the elder Dionysius made himself tyrant of the city. After a long and prosperous reign he was succeeded in 367 by his son, the younger Dionysius, who was finally expelled by Timoleon in 343. A republican form of gov. was again established; but it did not last long, and in 317 S. fell under the sway of Agathocles. This tyrant *d.* in 289, and, the city being distracted by factions, the Syracusans voluntarily conferred the supreme power on Hieron II., with the title of king, in 270. Hieron cultivated friendly relations with the Roms.; but on his death in 216, at the advanced age of ninety-two, his grandson, Hieronymus, who succeeded him, espoused the cause of the Carthaginians. A Rom. army under Marcellus was sent against S., and after a siege of two years, during which Archimedes assisted his fellow-citizens by the construction of various engines of war, the city was taken by Marcellus in 212. From this time S. became a tn. of the Rom. prov. of Sicily. S. declined under the dominion of the Roms., but owing to its beautiful edifices, and the fact of its being the centre of intellectual culture, it always held a prominent position. In A.D. 878 the Saracens captured the city, and looted it of its treasures, afterwards burning it to the ground. Although rebuilt the city never recovered its former importance. It suffered severely from earthquake in 1170 and 1693. *Consult* Freeman, *History of Sicily*. (2) A city and port of New York State, U.S.A., cap. of

Onondaga co., is built on the S. shore of the lake of Onondaga, 147 m. W. of Albany. It is the seat of a university, and is a commercial centre of great importance. The chief manufactures include machine-shop products, soda ash and kindred products, farm tools, furniture, typewriters, motors, machinery, and woollen goods; minor industries are connected with chemicals, salt, and pottery. S. was formerly a great salt-producing centre. There is a U.S. weather bureau attached to the university; it was opened in 1902. The Erie and Oswego canals connect it with the Great Lakes, the Hudson, and the St. Lawrence. Pop. (1930) 209,326.

Syr-Daria, a former prov. of Russian Turkestan, Asia, which was bounded W. by the Aral Sea and E. by E. Turkestan. Its area was 195,000 sq. m., and its pop. some 2,000,000. The prov. is now included in the Kazakstan A.S.S.R. (*q.v.*) and the Uzbek S.S.R. (*q.v.*). The prov. was steadily Russianised between 1845 and 1867, but the chief inhabitants are the Kirghiz Kajaks (*see* KIRGHIZ). There are some fertile regions in the S. where wheat, barley, rice, millet, oats, rye, and fruits are grown. Cotton is also cultivated. The area is rich in minerals, which include silver, porphyry, copper, lead, coal, salt, and turquoise. The prov. took its name from the Syr-Daria River (Jaxartes or Sihun), which rises in the Tian Shan Range and flows in a north-westerly direction for some 150,000 m., emptying itself in the Aral Sea. The river has a drainage area of 300,000 m., its main tributaries being on the right bank. The chief tns. in the prov. are Tashkent, Kokand, and Namangan. To the E. are the deserts of Kizil-Kum and Kara-Kum.

Syria, a republic of Asia Minor, having the Levantine seaboard on the W., and bounded on the N. by Turkey, on the E. by Iraq, and on the S. by Transjordan and Palestine. It was the Aram (or 'the highlands') of the ancts., and in a narrower sense implied only the region N. and N.E. of Palestine. Its surface is mainly plateau, gently dipping from the Libanus and Anti-Libanus ranges (6000—10,000 ft.) towards the Arabian Desert. The chief river is the Jordan, which rises on the W. side of Mt. Hermon and flows S. to the Dead Sea. The chief ports are Beirut, Acre, Tyre, and Tripoli. Area estimated at 60,000 sq. m. Total pop. (1929) 2,831,622. S. is now divided into four areas—(1) the Syrian Republic, comprising the territories of Damascus and Aleppo; (2) Greater Lebanon; (3) Alawiyra;

(4) Jebel Druse. The pop. is mainly Moslem (1,514,755), of whom two-thirds are of the Sunni sect. There are 86,125 Druses, 227,930 Alawiyya, and 14,882 Ismailians. Christians, one-third Maronites, number 505,419; Jews 16,526. There is a Syrian University at Damascus and one Fr. and one American university at Beirut. The vine is extensively cultivated, and fruit and cereals raised. Silk, olive oil, lemons and oranges, sesame, tobacco, and cereals are exported. Cotton is now being much cultivated, centre at Aleppo (annual yield some 25,000 metric quintals). The silk industry, however, is the most important, with centres at Beirut, Aleppo, Tripoli, and Latakia. The inhabitants of S. were of Semitic origin, of the same stock as the Hebrews. At the beginning of the Hebrew monarchy S. was divided into a number of petty kingdoms, which were generally at war with Israel. As the great Assyrian kingdom waxed, S. waned, and Damascus was destroyed by Tiglath-Pileser, king of Assyria, who conquered all S. about the middle of the eighth century B.C. After having successively been a part of the Assyrian, Babylonian, Persian, and Macedonian empires, S. once more became powerful under the rule of Seleucus Nicator (312 B.C.), with Antioch for its cap. Its strength was further increased by Antiochus the Great; it was then that Palestine became a Syrian prov. In 66 B.C. (after the destruction of the kingdom of S. by Tigranes), S. was added by Pompey to the possessions of the republic, and became a Rom. prov.; as such it is mentioned in the N.T. Much later Zenobia, Queen of Palmyra, endeavoured to make S. the seat of empire. The Rom. emperors were sorely put to it to defend S. from Persian incursions. When the Rom. empire was divided, S. was included in the Byzantine empire until 636, when it was conquered by the Saracens, who held it during the troublous times of the Crusades. S. later fell into the hands of the Egyptians, was overrun by the Mongol hordes in 1290, and its destruction was consummated by the Turks, who overthrew the Egyptians in 1516, from which time it remained a Turkish prov. During the Great War S. was taken from Turkey by Allied troops under Allenby. In 1919 Syrian nationalism occasioned an independent state, and the Emir Feisal, son of King Hussein of the Hedjaz, was proclaimed King of S. Hostilities between the Fr. and the Arabs overthrew this independence and compelled recognition of the mandate which had been assigned to France by the Allied Council at San

Remo (April 1920) and confirmed by the League of Nations (1922). French claims in the Levant had been asserted at the time of Turkey's entrance into the Great War, and the Sykes-Picot agreement between France and England (May 1916) recognised French interests as predominant in S. The mandate did not come into full force until Sept. 1923. Great Lebanon, which had been proclaimed a state since Sept. 1920, was reorganised as the Lebanese Republic, and its National Assembly (May 1926) elected Charles Debbas, an Arab, as President (re-elected May 1929). In 1925 the Fr. united the provs. of Damascus and Aleppo to form the Syrian Republic, of which Damad Ahmed Namy Bey was elected President. In Feb. 1928 a new nationalist gov. came in under the Kadi of Damascus, and in June a Constituent Assembly, meeting at Damascus, attempted to frame a constitution which gave the President wide powers, with S. as 'an independent sovereign state' constituted as a parliamentary republic. This constitution was not acceptable to France, and the Assembly was dismissed (Nov. 1928). Two years later the Fr. High Commissioner, Henri Ponsot, issued a statute for S. (May 22, 1930). By its terms S. was made a republic with a parliament elected for four years and a President with certain specified powers. The Jebel Druse had been in revolt from Aug. 1925 to March 1927 and was now made a component part of the Republic of S., but continued under a separate administration. The same applied to Alawiyya (Latakia). See also PALESTINE, DEAD SEA, JORDAN, LEBANON, PALMYRA, etc.

Syriac Language and Literature.

The Syriac language belongs to the Semitic family of languages, of which Hebrew is the chief, and is a branch of Aramaic. It is mentioned in the Bible in several places, and passages of Syriac occur here and there. In Dan. ii. 4 the Chaldean astrologers 'spake to the king (Nebuchadnezzar) in Syriack,' and six chapters of Syriac follow. Another long passage of Syriac occurs in Ezra iv. 7 ff. Passages in Syriac, or in which the language is referred to, are Matt. xxvii. 46; Mark v. 41, vii. 34; 1 Cor. xvi. 22, etc. It was spoken for more than a thousand years over a very wide region of Central Asia, and was the language of a large number of peoples. The term Syriac is sometimes used in a narrower sense to designate the dialect of Edessa, but this is not usual. The Syriac alphabet is founded upon the Hebrew, with alterations. The grammar of Syriac

is in general fairly simple. The syntax of Syriac resembles in general characteristics that of Hebrew. As regards phonology, Syriac tends to shorten Hebrew long vowels and to substitute dentals for sibilants. It was at one time thought that Syriac was a derivative of Hebrew. But recent discoveries at Singirli show that it was in existence about 700 B.C., and, although the language had fewer points of difference from Hebrew than that of later inscriptions, it had well-marked Syriac characteristics. It seems to have occupied much the same place in business and diplomatic affairs as Fr. to-day. This is shown by such passages as 2 Kings xviii. 26, and by the nature of the inscriptions which have been found in early Syriac. Syriac attained importance as a literary language, however, in the early centuries of the Christian era. One of the earliest translations of the Bible, the Peshitta (simple), was made in Syriac in the second century A.D., and Edessa rose to importance as a Christian centre. Shortly afterwards, the traditional commentaries on the O.T. (the Targums) were put into writing. The language of the Peshitta and the Targums differs in some important respects, and that of the Biblical passages has differences from both. By the fourth century, Christian writers had adopted Syriac as a literary language. The Syrian Church was split up into four sects—Malkites, Maronites, Nestorians, and Jacobites—all of which had their service-books and psalters. The greatest of the early Syrian fathers was St. Aphrēm (Ephraim) (d. 373). He was a voluminous writer of commentaries, homilies, and poetical treatises of various sorts. In the fifth century begins the vernacular Syriac historical literature. It was about this time that the pure Syriac language began to be corrupted by the importation of Gk. loan words, while Hebraisms also began to creep in. Isaac the Great of Antioch flourished in the fifth century. Like Ephraim he wrote a very large number of works, all of a religious tendency, and also like him wrote much verse. St. Simeon Stylites (d. 459) is remembered chiefly on account of Tennyson's poem. Meanwhile, the Syrian Church was torn with internal conflicts, which are reflected in the writings of the sixth and seventh centuries. Jacob of Serugh, Joshua Stylites, Sergius of Ras'aïn (fl. sixth century), John of Asia (b. c. 505), and Jacob of Edessa (b. c. 640), the Monophysite, are important names of the great age of Syriac literature (see Wright, *op. cit. infra*). But with the great schism in the seventh century

between the Nestorians and the Jacobites a separation took place, which implied a severance of tradition in the literature which emanated from the two sects. The writings of Denys of Talmahar and Thomas of Maraghah, however, deserve mention here. But the literature had reached its zenith just prior to the split between the sects, and it never regained its former glory. It practically came to an end with the conquest of Aramæa by the Arabs, though an exception must be made in the case of Bar-Hebræus (fl. thirteenth century), whose life was largely spent in trying to revive the Syriac language. Syriac is still used as a living language, though in a much corrupted form, by small groups of villagers in Mesopotamia. It is used, more or less in its classical form, as an ecclesiastical language by the Nestorian Church, but the priests who use it are often completely ignorant of the meaning of the formulas they utter. See Crichton's *Noldeke's Syriac Grammar*; W. Wright, *A History of Syriac Literature*; R. Duval, *La Littérature Syriaque*.



SYRINGA

Syringa, a genus of Oleaceæ, contains ten species which grow in Europe and Asia. The best known of these is *S. vulgaris*, the common lilac, often grown in Britain. The name of *S.* is also popularly given to several shrubby plants in the saxifragaceous genus *Philadelphus*.

Syringe (from the Gk. *σινιγίς*, a pipe), a hydraulic instrument used in medicine for injecting liquids into the body and for washing out wounds, etc. Its principle is the same as that of the pump (*q.v.*), and the essential features are a pointed nozzle and a glass, metal, or india-rubber tube attached thereto and fitted with an air-tight piston. The fluid is projected from the nozzle in a jet which is large in an abdominal as compared with a hypodermic S.

Syrinx, an Arcadian nymph, beloved of Pan, who seized her when she was changed into a reed and fashioned out of her a pipe, such as the shepherds were ever afterwards wont to play.

Syrtis, or **Syrtes**, the classical name of two gulfs, the Syrtis Major and the Syrtis Minor, in the Mediterranean, off the shores of N. Africa.

Syrup (from Arabic *sharab*, drink) is the same word as 'shrub.' It indicates primarily a saturated solution of sugar such as, together with distilled water and some therapeutic agent, is used for medicinal purposes. 'Goldensyrup' is the uncrystallisable fluid which is a by-product in the refining of crystallised sugar.

Syzygy (from Gk. *συσυγία*, a yoking together), an astronomical term denoting either of the two positions of the moon when it appears to be in a line with the sun.

Syzran, a tn. on the r. b. of the Volga, 89 m. S. of Simbirsk, in the Middle Volga Area, Soviet Russia. It has flour mills, and is the centre of a market-gardening dist. Pop. (1926) 48,458.

Szabadka (Ger. *Maria-Theresiopel*), a tn. 108 m. S.S.E. of Budapest, in Bács-Bodrog, Hungary, on the fertile plain between the Danube and the Theiss. It commands a prosperous trade in cereals, cattle, wool, skins, and fruit. Pop. 101,857.

Szarvas, a horse-breeding centre on the Körös, 40 m. E. of Kecskemet, in Békés, Hungary. Pop. 27,500.

Szatmar-Nemethy, or **Satmar**, a cathedral city, with commerce in potteries, linen, and wine, on the Szamos, 68 m. by rail N.E. of Debreczen, in Rumania. Pop. 35,000.

Sze-ch'uen, or **Szechwan** ('four rivers'), the largest province (218,480 sq. m. in area) of China, lying in the W. The highlands in the W. rise to 19,000 ft. and the N. is also mountainous, but over the E. and centre stretches a broad and fertile plateau, where cereals, sugar, tea, rice, oranges, rhubarb, and tobacco grow in plenty. The prov. is well watered by the Yang-tse-kiang in the S. and elsewhere by its large tributaries, the Fu-sung-ho, Min-kiang, and Kialing-kiang, which all rise in the N.W. There is considerable commerce in salt, timber, copper, coal, and white wax, which an insect secretes. Ch'eng-tu is the cap., but the chief treaty port is Chung-K'ing, from which silk—the first product of the prov.—and after that tobacco, medicinal plants, musk, wax, etc., are exported. Wanh sien (pop. 83,000) is another large port. Pop. 52,064,000.

Szegedin, or **Szeged**, a manufacturing city of Hungary, cap. of the comitat of Csongrad, is situated at the junction of the Theiss with the Maros, about 100 m. S.E. of Budapest on the Yugoslavian frontier. It is an extremely well-built tn., with many handsome and substantial edifices, having been entirely rebuilt since 1879, when the city was swept away by a disastrous inundation. Dykes now protect the tn., which is the second city of Hungary, and the commercial centre of the Alföld. Here is a university. Pop. (1928) 125,039.

Szolnok, a tn. on the Theiss, 66 m. by rail E.S.E. of Budapest, Hungary. A centre of the woollen and linen thread industries; it trades also in timber and tobacco. Pop. 29,000.

Szymanowski, **Karol** (b. 1832), a Polish composer, began writing in 1901, studied under Noskowski in Warsaw in 1903. He showed a beautiful inventive power, and his later works (Third Symphony, op. 27; violin concerto, op. 41, etc.) put him in the first rank of the pioneers of musical progress. His opera, *Hańsli* (1912), was performed in Warsaw in 1922; shows a mastery of polyphonic and instrumental technique.

T

T, the twentieth letter of the alphabet, is a voiceless dental explosive. The earliest form of the letter was **X**, and the Phœnician name for it was *tau*, which means 'cross' or 'sign.' In early Gk. MSS. we find it written **τ**, which came to be written **T**, its final form. According to the 'first sound shift,' which took place in the Primitive Germanic period, *mediæ* became *tenues*, *tenues* aspirates, and aspirates *mediæ*. (These changes were formulated into a definite law by Grimm in 1822.) See GRIMM'S LAW. In science, **T** usually represents temperature on the Absolute scale, and *t* temperature on the Centigrade scale. In chemistry, **Ta**, **Tb**, **Te**, **Th**, **Tl** and **Tm** are the atomic symbols for tantalum, terbium, tellurium, thorium, thallium, and thulium respectively.

Taafe, Count Eduard Franz Joseph von (1833-95), an Austrian statesman of Irish descent, *b.* at Vienna. From 1863 till 1867 he was governor of Salzburg; in the latter year he entered the Austrian cabinet as minister of the interior. He was premier from Oct. 1869 to Jan. 1870, when he was again minister of the interior for a time. After being governor of the Tyrol, he became premier in 1879, and retained the office until his resignation in 1893. **T.** had great charm of manner and tact, and these served him in good stead in uniting the various nationalities of the empire.

Tabard (Fr. *tabarre*, from Low Lat. *tabardum*), a military garment in general use in the latter half of the fifteenth century, which fitted closely to the body, was open at the sides, had wide sleeves or flaps reaching to the elbow, and displayed the armorial ensigns of the wearer on the back and front. About the middle of the sixteenth century the **T.** ceased to be used except by the officers of arms, who still continue to wear **Ts.** embroidered with the arms of the sovereign.

Tabari Abū Ja'far Mohammed ibn Jarir at Tabari (838-923), an Arabian

theologian and historian, *b.* at Amol, who after a series of wide travels finally settled as teacher of the law at Baghdad. He is famous as the author of the *Annals* (*Tarikh ur Rusul wal Muluk*), the first Arabic history of the world. He is also the compiler of the most famous commentary on the Koran.

Tabariyeh (anct. *Tiberias*), a tn. of Palestine, on the lake of Gennesaret or Tiberias, 27 m. E.S.E. of Acre, was the Rom. cap. of Galilee, and the scene of a defeat of Crusaders by Saladin (1187). See further under **TIBERIAS**.

Tabasco, a southern state of Mexico, bounded on the N. by the Gulf of Mexico, on the E. by Campeachy and Guatemala, on the S. by Chiapas, and on the W. by Vera Cruz. The surface is flat and the soil fertile, yielding cacao, sugar, coffee, tobacco, rice, and fruit. Oil is found. The chief tns. are Villa Hermosa (cap.) and Frontera (port). Area 10,374 sq. m. Pop. (1921) 210,437.

Tabernacle, **The**, a portable tent-like structure set up by the Israelites in the wilderness for the worship of Yahweh and carried with them in their journeys. Various terms are used for this tabernacle, and it is important to distinguish between the various descriptions of it given in the separate strata of the Hexateuch. Exodus xxxiii. 7-11 gives the earliest reference (*E*), and this passage compares in a striking manner with the elaborate description given by P (*Exodus xxv.*, etc). See article in *Temple Dictionary of the Bible*, 1910.

Tabernæmontana, a hot-house shrub of which the best variety, *coronaria*, has abundant white flowers in summer Order Apocynaceæ (*q.v.*).

Tabes Dorsalis, see **LOCOMOTOR ATAXIA**.

Tabes Mesenterica, a tuberculous disease of the mesenteric glands, lymphatic glands of the mesentery, a fold of the peritoneum connecting the intestine with the posterior abdominal wall. The disease usually occurs in

children, and is characterised by progressive wasting, while the abdomen may become much enlarged through the glands being filled with masses of caseous tubercular matter. Surgical treatment and attention to hygienic conditions may result in a cure.

Tablat, see ST. GALL.

Tablatures, systems of notation used during the fifteenth and sixteenth centuries for instrumental music. No staff, as used in vocal music, was employed; but the letter-names of tones were ranged horizontally and divided by vertical lines into bars, after the style of Tonic Sol-fa, the signs of duration being written above. Both lute T. and organ T. were used, the latter for all keyboard music.

Table Bay, an inlet of the Atlantic in the S.W. coast of the Cape of Good Hope, affords a safe anchorage for the largest ships.

Tableland, see PLATEAU.

Table Mountain, or Tafelberg (3540 ft.), a mountain of the Cape of Good Hope, overlooking Capetown and Table Bay. The level top gives it the appearance of a table, and it is often covered with a dense white cloud called 'The Tablecloth.'

'Tablet, The,' the official organ of the Rom. Catholic Church in England. It was founded by Frederick Lucas in 1840. Published at 19, Henrietta St., Covent Garden, London.

Table Tennis, see PING-PONG.

Tabley, Baron de, see DE TABLEY.

Tabur: (1) A tn. of Bohemia, Czechoslovakia, on the Luznica, 65 m. S. of Prague. It was founded by and long formed a stronghold of the Hussites (see HUSSITES, WAR OF). There are spinning mills, machine shops, and tobacco factories. Pop. (1925) 12,600. (2) (Arabic *Jebel-el-Tor*), a mountain in Galilee (1843 ft.), 7 m. E. of Nazareth. It is the traditional scene of the Transfiguration. It rises abruptly from the plain S.E. of Nazareth—a dome-shaped mass whose summit is divided between the Orthodox and the Franciscans, each possessing a church and conventual buildings, and the latter a comfortable hospice. The Franciscan church is a magnificent modern basilica on the site of the mediæval church built in the N. Syrian style of the sixth century by Barluzzi, the architect of the Franciscan basilica of Gethsemane.

Tabora, a tn. in the centre of Tanganyika Territory, 210 m. E. of Ujiji (Lake Tanganyika). Formerly an important centre of the ivory trade, it is on several trade routes and rlys. It was captured from the Gers. by the Belgians, 1916. Pop. 20,000.

Taborites, see HUSSITES, WAR OF.

Tabriz, an auct. city and a commer-

cial centre of Persia, cap. of Azerbaijan prov., stands on a small riv. running into Lake Urumiah. It was nearly destroyed by an earthquake in 1721. It is a centre of the carpet-making industry, and has a match factory. It was occupied by both Turks and Russians during and after the Great War. Pop. 180,000.

Tabu. T. is a Polynesian word meaning 'forbidden,' and, as such, is applied to prohibited practices in religion or magic. It is not, however, confined to Polynesia, but is found, though to a less degree, in America, Africa, Madagascar, N. and Central Asia, and India, and forms of T. are found among civilised peoples. Among savages T. is in vogue for the purpose of protecting chiefs against evil, especially against evil spirits, and of guarding against the risks incidental to contact with unclean objects. Such experiences as birth, initiation, marriage, and sexual practice are brought under its operations with the aim of protecting them against hostile influences. Offences against the code regulated by the laws of T. are regarded very seriously, and the offender himself becomes T., and is punished under penalties which range from death to the imposition of fines. A specially comprehensive system of T. is enforced against women during menstrual periods because of the physical dangers arising from contact with others at that time, and women who are pregnant are similarly protected. T. in various ways extends also to strangers and magicians and to certain places. It is obvious that from elementary laws involved in a system of T. much of present-day social morality has developed. Among the Jews offences against laws relating to the eating of unclean food afford a parallel. Other names among native races where a form of T. is practised include tambu in Melanesia, pantang in the East Indies, fadi in Madagascar. It appears also in the form taboo and tapu. See also MAORIS.

Consult Sir T. G. Frazer, *The Golden Bough*; Skeat, *Malay Magic*; von Gennep, *Tabou et totemisme*; Crawley, *Folklore*; Cook, *Voyages*; Ellis, *Polynesian Researches*.

Tacca, a genus of perennial plants (order Taccaceæ) with tuberous roots which are rich in starch. A fecula is extracted from some of the species, notably *T. pinnatifida*, and exported from the Malay Peninsula as a substitute for arrowroot.

Tacheometry, see SURVEYING AND LEVELLING.

Tachometer, an instrument for measuring directly the angular velocity of a rotating shaft. It registers

the number of revolutions per minute. It resembles a Watt's governor, but is fixed with its spindle horizontal and driven by the revolving shaft. In small instruments, the spindle is pointed and is pressed firmly into the end of the shaft. In the larger instruments a belt and pulley arrangement is employed. Owing to the rotation, the weights have a tendency to fly off tangentially, this tendency being resisted by a spring which thus actuates a needle which moves round a dial indicating the revolutions per minute. In the larger instruments where more exact results are required a speed counter is employed, the revolutions being counted in this case by the action of a train of wheels.

Tachylite, the term used to cover the glassy representatives of basalts and pyroxene andesites. It occurs as a thin crust on some lava flows and as a narrow selvage to dykes, and consists of a brown or yellow glass crowded with incipient growths of magnetite.

Tacitus (c. A.D. 55-120), a Rom. historian, whose full name was either Publius or Gaius Cornelius T. He was b. either at Rome or Terni; studied rhetoric and became an eminent pleader. In 78 he married the daughter of Agricola, governor of Britain. He was quaestor in 79 and praetor in 83, and in 89 went to Germany, where he remained, probably as a governor, till 93. In 97 he became consul under Nerva, after having been a senator during the reign of terror of Domitian. He was the colleague of the younger Pliny in the prosecution of Marius Priscus in 99, after which little is known of his life. Only a part of his works are extant. These include: *Dialogus de Oratoribus* (76 or 77), a pessimistic work dealing with the decline of the rhetorical art; *Agricola* (98), a biography of his father-in-law; *Germania*, or *De situ, moribus, et populis Germaniae*, a valuable ethnographical work on Germany; *Historiae*, a history of the empire from Galba to Domitian, in twelve books, of which only four and a half remain; *Annales* (115-117), a history of the empire from Augustus to Nero. His style is forceful, condensed, and epigrammatic. Among the editions of his works are those by Orelli (1846) and of the *Opera Minora* by H. Furneaux (1900) and of the *Annales and Historiae* by C. H. Fisher (1906-1910). The *Dialogus* (ed. W. Peterson), *Agricola and Germania* (ed. M. Hutton), and *Historiae* (ed. C. H. Moore) are pub. with text and translation in the Loeb Library. In the Oxford Translations the *Historiae* (1902) and the *Agricola, Germania, and Dialogue* (1903) have been trans. by W. E. Frye.

Tacitus, Marcus Claudius (A.D. 275-276). He became emperor at Rome in September after the murder of Aurelian. His short reign (he d. in April) was notable both for improvements at home and victories abroad.

Tack, in Scots law, the technical name for (1) a lease whether of land or edifices; (2) any contract under which something is let for hire.

Tack, a rope, wire, etc., which is used to secure the windward clews or corners of the courses to the ship's side, and the windward lower end of a fore-and-aft sail amidships. Also, in all triangular sails and in those four-sided sails where the head is not parallel to the foot, the foremost corner at the foot is called a T. A ship is said to *tack* when the T's are shifted and the yards braced, and the ship's head turned to the wind, so that she shall sail at the same angle to the wind on the other side; thus by alternate T's a ship proceeds against the wind in an oblique direction, or 'beats to windward.'

Tacna-Arica Question. The prov. of Tacna-Arica, between Chile and Peru, was originally ceded to Chile by Peru in 1884 for a period of ten years. It was arranged that at the expiration of this lease a plebiscite should be taken to decide the future possession of the prov. No plebiscite was taken, however, and Chile continued in occupation. Diplomatic relations between the two countries were broken off and were not resumed until 1923. In Feb. 1929 Chile and Peru reached an agreement whereby 3281 sq. m. in Tacna were allotted to Peru, while Chile remained in possession of Arica. The territory under the Chilean Gov., originally some 9,000 sq. m., was reduced to 5,900 sq. m., and Chile also agreed to pay Peru ten million U.S. dollars. Chile undertook to build a mole in the port of Arica. The boundary line dividing the two countries now begins at the mouth of the Rio Lluta and ends at the Bolivian frontier nearly 7 m. N. of the Arica-La Paz railway. The Peruvian dept. of T. has an area of 12,590 sq. m. and a pop. (1927 est.) of 60,000.

Tacoma, a city and seaport of Washington, U.S.A., and the cap. of Pierce co., at the head of Puget Sound. It has an excellent harbour, and it is one of the principal ports on the Pacific coast. There is an important export trade; lumber, flour, and fish are the chief articles; and there are foundries, smelters, meat-packing establishments, etc. It is the chief western terminus, North Pacific Railway. Pop. (1930) 106,817.

Tacoma Mount, see RAINIER.

Taconic Mountains, a range of hills in Vermont, U.S.A., which contains

strata of Cambrian age (with *Olenellus Thompsoni*, etc.) which have been more or less metamorphosed during Silurian time.

Tacsonia, a genus of climbing plants (order *Passifloraceæ*), with deeply lobed leaves and an elongated tubular calyx, a feature which distinguishes them from the genus *Passiflora*.

Tactics, see STRATEGY AND TACTICS.

Tadcaster (Rom. *Calcaria*), a market tn. of the W. Riding of Yorkshire, England, on the R. Wharfe, 9 m. W.S.W. of York. There are good building-stone quarries near by. Pop. (1931) 4005.

Tadema, see ALMA-TADEMA.

Tadmor, see PALMYRA.

Tadoussac, see SAGUENAY.

Tadpole, see FROGS.

Tael, a unit of weight used in China, Philippines, Straits Settlements, etc., equal to one Chinese ounce, i.e., 1.33 oz. avoirdupois. The weight varies, however, according to locality, being 1.28 oz. in the Philippines, 1.35 in Java, 2.13 in Siam, etc. The T. is also a money of account, divided into ten mace; the value varies with locality and the fluctuations of bullion, etc. A customs (haekwan) T. is a T. weight in pure silver, equal to 1600 or 1700 copper cash. The value of this varies considerably from 2s. 6d. upwards.

Tænia, see TAPEWORM.

Tænia, the name given in architecture to the projecting fillet on top of the architrave (q.v.). The T. of a Doric entablature is plain, but in the Ionic, Corinthian, and Composite orders it is decorated in various styles of moulding.

Tae-Pings, the name given to the Chinese rebels who made their appearance in 1850, and (see CHINA) desolated some of the best cultivated provs. of China. Peking was taken by the Eng. and Fr. on Oct. 12, 1860. Its capture was followed by the ratification of the Treaty of Tien-tsin, which, granting important privileges to European merchants, made it the direct interest of the Eng., Fr., and American govts. to re-establish order in China. The repulse of the rebels at Shanghai in Aug. 1860 had been followed by several engagements between them and the imperialists, in which they were defeated. Ward, an American, who had taken service under the emperor, had wrought a wonderful improvement in the imperialist army, and was the chief means of their success. In the beginning of 1862, the T. again advanced on Shanghai, and were twice defeated. In the autumn of the same year Ward was killed. Some time previously, Eng. officers were permitted to take service under the Emperor of China, and 'Ward's force,' handed over to

an Eng. officer, took the name of 'Gordon's Brigade.' The rebels were defeated in upwards of sixteen engagements; and in 1864 almost every important city was taken from them. The conduct of the imperial authorities at Su-chow, where a horrible massacre took place, led to the withdrawal of the Eng. military force; but the rebellion had been effectually checked. Towards the end of 1864, the T., however, still offered an opposition to the imperialists in Kiang-tsu, all the more formidable in consequence of the prevalence of brigandage and insurrectionary movements in parts of the empire not affected by the T. rebellion. The last embers of the T. rebellion were trodden out in Feb. 1866, when from 30,000 to 50,000 rebels were routed by the imperial army at Kia-ying-chou in Kwan-tung. See A. Wilson, *Gordon's Chinese Campaign*, 1868; A. E. Hake, *Events of the Tai-ping Rebellion*, 1892.

Taff: (1) A riv. of Wales in Brecknockshire, which rises in Brecknock Beacon and flows S.E. to the Bristol Channel, through Glamorganshire. Its valley is entirely occupied with coal and iron industries. Length 40 m. (2) A riv. of Pembrokeshire, Wales, which rises on the E. side of Preselau Mts., in the parish of Llanfyrnoch, and flows S. through Carmarthenshire to Carmarthen Bay. Length 25 m.

Taffeta, or **Taffety** (Persian *tāfta*), a term formerly applied to plain woven silks, which were introduced into England about the fourteenth century. It is now used of mixtures of silk and wool.

Taflet, or **Taflelt**, an oasis on the S.E. of the Atlas Mts., Morocco, noted for its dates. It is a caravan centre, and has been a place of exile for political offenders. Pop. 100,000.

Taft, William Howard (1857-1930), 27th President and 10th Chief Justice of the U.S.A., was b. in Cincinnati, Ohio, Sept. 15. His father, Alphonse T., was Secretary of War and Attorney-General in President Grant's Cabinet, and later U.S. Minister to Austria and Russia. He graduated from Yale University, 1878, and from Cincinnati Law School, 1880, with honours in both places. By 1881 he had been made Assistant-Prosecuting Attorney of Hamilton county. In 1882 he was appointed to the remunerative post of U.S. Internal Revenue Collector for the first Ohio dist. From 1885 to 1887 he was assistant-solicitor of Hamilton co. In 1887 he was a judge of the Supreme Court of Ohio. In 1890 he was appointed Solicitor-General of the U.S.A. In 1892 he was made U.S.

Circuit Judge for the 6th Circuit. In the meantime, also, for some years he was Dean of the University of Cincinnati's law school. In 1900 President McKinley made him President of the Philippines Commission, and in 1904 appointed him Governor-General of those islands. His ability, his bonhomie, his energy did much to pacify the islands. He settled many outstanding questions. Among others he personally visited Pope Leo XIII., and settled matters arising out of the confiscation of church lands in the Philippines. In 1902 the American Gov. paid seven million dollars for them. In 1904 President Roosevelt made him Secretary of War. In 1907 he was provisional governor of Cuba when trouble broke out in that island, and in the same year he was sent on important missions to Panama and the Philippines, opening the first legislative assembly in the latter. Roosevelt practically dictated the nomination of T. for President by the Republican convention and he was easily elected, beginning his term in March 1909. The Roosevelt partisans expected him to continue the Roosevelt policies. But T. showed that he intended to be his own President and not a mere custodian. He replaced the Roosevelt Cabinet with one largely of his own choosing. Recrimination followed and many of the services he had rendered were forgotten. It was upon his recommendation that Congress instituted the postal savings system and parcel post mail delivery. He pushed the building of the Panama Canal. Publication of party campaign expenses was made obligatory. The income-tax amendment was enacted into law. The Interstate Commerce Commission was clothed with real powers to fix railway rates. T. prepared the way for the first real national budget system. He did not belabour the trusts with words, as did Roosevelt, but during his term he secured more indictments of trusts than his predecessor did in his seven years in office. He ordered his Attorney-General to push to a finish the anti-trust suit against the Standard Oil Company and the American Tobacco Company, and secured judgments dissolving them. So much for the positive side. But the shadows were soon to gather round T.'s administration. Roosevelt had never tackled the tariff question, although the country was dissatisfied with the law as it stood. T. got Congress to work on a new Tariff Bill. The House of Representatives adopted a moderate Bill which halved many of the tariffs. However, the business interests of the country

intervened in the Senate where, under the guidance of Senator Aldrich, Republican 'boss' of that body, the tariffs were revised upwards. The Bill as eventually agreed to by both Houses of Congress was worse than the one it replaced. T. signed it and made an unfortunate speech describing it as the best the country ever had. Then followed a famous episode. Taft had replaced James R. Garfield as Secretary of the Interior by R. A. Ballinger. Charges were made that under his administration some big business interests had been unduly favoured in obtaining control over coal lands in Alaska, which had been reserved by the gov. A congressional committee investigated and exonerated Ballinger, but public opinion was against the administration, and to relieve the President of any embarrassment Ballinger resigned. The progressive elements now generally looked upon T. as reactionary in his policies. Senator J. P. Dolliver of Iowa described the President as a fat person entirely surrounded by men who know exactly what they want. The country was feeling the pinch of the high cost of living, largely attributed by the masses to the Payne-Aldrich tariffs. In 1910 Roosevelt returned from his hunting trip in Africa. In 1911 he was writing editorials for *The Outlook*, a weekly magazine, and in these he attacked the arbitration treaties T. had so much at heart. Roosevelt was resentful over the Ballinger incident, but it is believed that the last straw was when Attorney-General George Wickersham, at T.'s orders, filed a suit for the dissolution of the U.S. Steel Trust. Wickersham alleged that one of the defendant's sins was its purchase of the Tennessee Coal and Iron Company during the panic of 1907. This seemed a blow directly at Roosevelt. As President he had authorised the trust to buy the other company, believing it necessary to stop the 1907 panic. But Roosevelt's enemies had called it a 'Wall Street swindle.' Roosevelt always defended his action, and continued to do so now. He showed his resentment by refusing to speak at a peace dinner to be addressed by T. in New York City, Dec. 11, 1911. On Feb. 24, 1912, forgetting all about his resolution never to run for President again, Roosevelt declared his 'hat was in the ring.' In the summer of 1912 T.'s friends controlled the Republican National convention and renominated him for President. Roosevelt and his friends withdrew; but later they held another convention and nominated Roosevelt for President on the Bullmoose ticket. Woodrow Wilson,

Democrat, was elected President, carrying most of the states in the union. Roosevelt had succeeded in dividing the Republican vote. T. was the worst beaten candidate in American history, only securing the votes of two states, Utah and Vermont. Roosevelt, on the other hand, had carried Michigan, Minnesota, Pennsylvania, South Dakota, Washington, and eleven out of thirteen votes in California. The electoral vote was 235 for Wilson, eighty-eight for Roosevelt and only eight for T. Not the least embittered, T. in 1913 took up the post of Professor of Law at Yale, his old university. When the U.S. entered the Great War, President Wilson named T. as one of the two joint chairmen of the War Labor Board, whose job it was to settle labour disputes. By speech and deed he tried to help the Wilson administration when Roosevelt was bitterly critical. The two former friends met unexpectedly in Chicago in May 1918. They happened to be in the same hotel. Hearing this, T. went into the dining-room where Roosevelt was alone, and extended his hand. Thus, due to the generous action of T., was ended the long-standing feud. Again, unlike many partisan Republicans in the U.S. Senate, T. in public speeches endorsed the Versailles Treaty and the League of Nations Covenant that Wilson had so much at heart. In June 1921 President Harding named him Chief Justice of the U.S. Supreme Court. He was thus the only man in American history who had held both the posts of President and Chief Justice. He served with assiduity until February 1930, when he resigned on account of illness. He *d.* in Washington, March 8, and was buried in the National Cemetery at Arlington.

Taganrog, a tn. and seaport of Russia in the N. Caucasian Area, on a bay of the Sea of Azov. Owing to the silting up of the harbour and the competition of Rostov, trade has declined. Tchekhov was a native of T. Pop. (1926) 86,465.

Tageles, *see* MARIGOLD.

Taghanic Mountains, *see* TACONIC MOUNTAINS.

Tagliacozzo, a tn. and com. of Aquila prov., Italy. Pop. 10,300. The scene of a battle in 1268 between Charles of Anjou and Conrad of Hohenstaufen, grandson of the Emperor Frederick II., which resulted in the defeat and execution of the latter.

Tagore, Sir Rabindranath, Indian poet, b. 1861. Lived in Calcutta at first. Managed father's estates in country from age of twenty-four. At forty founded school at Santiniketan: this became an international

institute—the Visva Bharata. Visited England, May 1913, and for the Indian Art and Dramatic Society read an Eng. translation (from the Bengali) of one of his own lyrical works, *Chitra*. Has written plays, songs, and novels, as well as love-poems, hymns, and other verses. Prose translations of his *Gitanjali* (Song Offerings), made by the author himself, were published in 1913; and W. B. Yeats wrote an introduction to the volume. In Nov. 1913 he was awarded the Nobel Prize for Litera-



SIR RABINDRANATH TAGORE

ture. Knighted, 1915. In U.S.A., 1930. His works in Eng. comprise: *Sādhanā*, 1914; *Kabir's Poems*, 1915; *Hungry Stones*, 1916; *Nationalism*, 1917; *The Home and the World*, 1919; *The Wreck*, 1921; *Creature Unity*, 1922; *Greater India*, 1923; *Red Oleander* (play), 1924; *Fire-Flies*, 1928; *Lectures and Addresses*, 1928; *Letters to a Friend*, 1928; *Thoughts*, 1929; *The Religion of Man*, 1931; *The Child*, narrative poem, 1931. *See* E. Thompson, *Rabindranath Tagore, Poet and Dramatist*, 1926.

Tagus, the chief riv. of the Iberian peninsula, which rises in the Sierra Albarracín, in 40° 38' N. and 1° 35' W. It flows W.S.W. in Spain through New Castile and Estremadura, and then takes a more southerly course through Portugal. Above Lisbon it widens out from 3 to 8 m. and empties its waters by two arms into the Bay of Lisbon. The chief tributaries are the Albarche, Tietar,

Jarama, etc., and the chief tns. on its banks are Toledo in Spain and Lisbon in Portugal. It is navigable to Santarem, but the rapids impede its utility. Length 566 m.

Tahiti, or Otaheite, the largest of the Society Is. (g.r.), a Fr. possession of the E. Pacific. It is a picturesque island, of volcanic origin, composed of two almost circular mountainous areas joined by a low and narrow isthmus; the area to the N.W. is the larger and more lofty, rising to a height of 7688 ft., whereas the S.E. area, Taitarapu Peninsula, is nowhere more than 4119 ft. A narrow but very fertile coastal plain surrounds the mountainous interior. The climate is, for the tropics, very healthy; there is an abundant rainfall, and the island is rich in vegetation, though not greatly cultivated. The chief products are coffee, sugar-cane, coconuts, bread-fruit, yams, bananas, oranges, vanilla, etc. The preparation of copra, sugar, and rum are the chief industries, and copra, vanilla, coconuts, phosphates and mother-of-pearl form the chief exports. The export trade in 1928 was valued at 46,250,276 fr., the import trade at 52,752,715 fr. The cap. is Papeete, on the N.W. coast, and here resides the governor of the Fr. South Sea possessions, who is assisted by a director and a privy council. The inhabitants of T. are a Polynesian race of tall stature, well formed, and frequently of considerable beauty. They are a light-hearted, generous people, but nevertheless capable of great cruelty, and were formerly cannibals. The island was discovered in the seventeenth or eighteenth century: it was visited by Bougainville, who named it La Nouvelle Cythère, 1768; by Captain Cook, 1769; and by the *Bounty* mutineers, 1788. The island came under Fr. protection in 1843, and in 1880, on the abdication of Pomare V., was made a Fr. colony. Area 600 sq. m. Pop. (1926) 8555. See G. Calderon, *Tahiti*, 1921; R. Keable, *Tahiti, Isle of Dreams*, 1925.

Taichu, or Taiwan, a tn. in the W. of Formosa, Japan. Pop. (1927) 46,255.

Taihoku, or Tai-Peh-Fu, the chief tn. of Formosa, Japan, situated in the N. on the R. Tamsui. Tea, rice, and jute are grown. Pop. (1927) 211,896.

Taillé, in anct. Fr. jurisprudence a tax tallage or subsidy; any imposition levied by the king or any other lord on his subjects. The effect of this impost, as it subsisted in France down to the end of the eighteenth century, was to discourage agriculture, for it was a tax upon the

supposed profits of the farmer, as estimated by the stock upon the farm. The general result was that it was to the interest of the farmer to appear as small as possible, to employ very little in cultivation of the land and nothing in improvement. See Smith, *Wealth of Nations*, bk. ii.

Taillefer, a Norman bard and warrior of the eleventh century who fought and fell in the Battle of Hastings, 1066. Wace, in the *Roman de Rou*, says that he led the Norman troops, and sang before them of Roland, of Charlemagne, and of the heroes of Roncevaux.

Tailor-bird (*Orthotomus sutorius*), a small bird, native of India and other parts of Asia, where it feeds on ants and other insects. It is about 6 in. long and of olive-green colour with markings of other tints. Its nest is a dainty structure of leaves joined together with silk, wool, hair, and vegetable fibre, and contains three or four vari-coloured eggs.

Tain, a royal and parl. burgh of Scotland, in the co. of Ross and Cromarty, on Dornoch Firth, 4½ m. S.W. of Dornoch. It has a collegiate church, founded in 1471 and restored in 1871-76. The wife of Robert Bruce sought sanctuary here in 1306. The industries are woollen manufactures and distilling.

Taine, Hippolyte Adolphe (1828-93), a Fr. historian, logician, and critic, b. at Vouziers and educated at Collège Bourbon and Ecole Normale. After serving in the provinces under the ministry of Public Education, he returned to Paris (1852) and won his *D. ès Lettres* (1853) with a critique on La Fontaine. The following year his essay on Livy gained the Academy prize, and he decided on literature as a profession. His writings of this period, apart from the *Voyage aux Pyrénées* (1855), consisted principally of contributions to the *Revue*, e.g. the celebrated essays on nineteenth-century Fr. philosophers (collected edition 1857). Later works were the *History of English Literature*, 1863; *Philosophy of Art*, 1865; *The Ideal in Art*, 1867; *Critical and Historical Essays*, 1858 and 1865; *Theory of Intelligence*, 1870; *Notes on England*, 1872. His greatest work, the *Origins of Contemporary France*, was left unfinished. In 1863 he became an examiner at St. Cyr, and in 1864 a professor at the Ecole des Beaux-Arts; he received the Legion of Honour in 1866 and the Oxford D.C.L. during his second visit to England (1871). See *Lives* by Lacombe (1906) and Neol (1908), and (in Eng.) Mrs. R. L. Devonshire's translation of the official three-volume *Life* (1902-08).

Tai-Peh-Fu, see TAIHOKU.

Tait, Archibald Campbell (1811-82), Archbishop of Canterbury, b. in Edinburgh. He was educated at Glasgow University and Balliol College, Oxford. In 1856 he was made Bishop of London, and twelve years later was raised to the primacy.

Tait, Peter Guthrie (1831-1901), a Scottish mathematician and physicist, b. at Dalkeith and educated at Edinburgh Academy, Edinburgh University, and Peterhouse, Cambridge. He became senior wrangler and first Smith's prizeman in 1852. In 1854 he was appointed to the professorship of mathematics in Queen's College, Belfast, and removed to Edinburgh in 1860 to occupy the chair of natural philosophy. In mathematics he is well known for his development of the theory of quaternions. His physical researches and experiments were mainly in connection with thermodynamics and thermo-electricity. He collaborated with Professor Thomson (Lord Kelvin) in the production of their *Treatise on Natural Philosophy*, with Balfour Stewart in writing *The Unseen Universe and Paradoxical Philosophy*, and with W. J. Steele in *The Dynamics of a Particle*. Besides numerous mathematical and physical papers, he published treatises on *Heat, Light, Properties of Matter, Dynamics, and Quaternions*. Biographical details may be found in the Life by C. G. Knott, published in 1911.

Taiwan, see FORMOSA.

Tai-yuan-fu, a walled city of Shan-si, China, and cap. of the prov., on the Fuen-ho R., with gov. arsenal, etc. Pop. (estimated) 80,000.

Tajik, or Parsiwan, a Persian-speaking race of Afghanistan, representing the serving class of that country and of the country N. of the Oxus. The Ts. ('strangers') are an athletic race, fine fighters, and skilled farmers. They have assimilated the manners and customs of the Afghans, but are not nomadic. Ts. form 0.6 per cent. of the pop. of Soviet Russia. Pop. (est.) 900,000.

Tajikistan, a republic of Soviet Central Asia, also known as the Tajik Socialist Soviet Republic, was established, as an autonomous republic, in 1925 from those regions of Turkestan and Bokhara inhabited mainly by Tajiks. In Dec. 1929 it became a federal state. It lies N. of the R. Oxus, bounded by Uzbekistan on the W. and N., the Kirghiz Republic on the N., Chinese Turkestan on the E., and Afghanistan on the S., and has an area of 56,608 sq. m. Stalinabad (formerly Dushambe) is the cap. Farming and cattle-breeding are the chief occupations of the inhabitants; cotton-growing is a

recent development, but, owing to irrigation, has been so successful that there were in 1929 250,000 acs. devoted to it. Gold, oil, and coal exist, and are recovered by primitive methods, and it is believed that the mineral resources are great. There are eight cotton mills in T., three vegetable oil mills, and an electric station. Communications are poor, the only roads being camel tracks; some motor roads are under construction. Stalinabad is connected by rail with Termez (124 m.) and by air line with Termez and Kagan. Pop. (1927) 827,400.

Taj Mahal, a famous mausoleum at Agra, built by Shah Jehan about 1629-50 as a tomb for his wife, Mumtaz Mahal.

Takla-makan Desert, a desert of Eastern Turkestan, forming part of the Gobi Desert. It is bounded on the E. by Lob Nor, on the W. and N. by the R. Tarim, and on the S. by the Kuenlun Mts. It extends E. and W. for 600 m., and from N. to S. for about 200 m. It is traversed by the R. Khotan, whose course Carey, in 1885, followed to its junction with the Tarim.

Takoradi, a port of the Gold Coast, Africa, was opened as a port in Dec. 1928, the harbour having been opened the previous March. It is the only complete shelter, between Nigeria and Sierra Leone, for ships of over 30 ft. draught. It is a wireless station. The chief exports are gold, manganese ore, cocoa, palm oil and kernels, kola, hides and mahogany.

Taku Forts, a fort. village, Chi-li prov., N. China, near the mouth of the Pei-ho, 30 m. E. of Tientsin. It was taken by the Fr. and Eng. fleets in 1858-60 and successfully held against several attacks, and again by the allied troops in June 1900 during the Boxer rising.

Talavera de la Reina, a tn. of Spain, in the prov. of Toledo, on the Tagus, 75 m. S.W. of Madrid, in a fertile wine-growing dist. It possesses very fine squares and streets, with Rom., Moorish, and Gothic remains, and has manufs. of silk and earthenware. See also TALAVERA, BATTLE OF. Pop. 13,523.

Talavera, Battle of, fought on July 27 and 28, 1809, between the Fr. army under the nominal command of King Joseph and Jourdan, but the effective command of Claude Victor, Duc de Belluna, on the one side and the combined British and Spanish armies under Wellington and La Cuesta, respectively. As a fact La Cuesta had been forced on Wellington by the Junta of Seville, and, but for the difficult situation, it is improbable that Wellington would have assented

to undertake any campaign in conjunction with a Spanish general. The Fr. Southern Army, however, was in sore straits, and therefore Victor made Talavera his headquarters with the object of being in touch with Madrid. Wellington's army of 20,000 men and Cuesta's of 35,000 advanced from Almaraz, and Victor, evacuating T., fell back slowly towards Madrid with the expectation of joining forces with Sebastiani's army of La Mancha, as well as reinforcements from Madrid. Matters did not go well for the British in the opening moves, La Cuesta proving to be a perplexing colleague, while the Junta's army of La Mancha under Venegas utterly failed in its allotted function of distracting Sebastiani and King Joseph by a feint attack on Madrid. Had Venegas carried out his task, Victor might have been overwhelmed in isolation; but in fact he remained supreme, and Sebastiani got away unperceived, and thus Wellington found himself opposed by 50,000 troops, exclusive of the army of La Mancha. The battle was bitter and bloody. Wellington's and Cuesta's troops were aligned from the Tagus for 3 m., and held the left of T.; their opponents held the right of the tn. and its suburb and its olive groves. Victor, eschewing the counsel of Joseph and Jourdan, launched three furious assaults on the British position, leaving only some cavalry to hold Cuesta's Spaniards. He had never previously met Wellington, and, on seeing the thin British line, believed his task to be an elementary one, especially as his force outnumbered the British by two to one. The British left flank broke, but Wellington saved the day with his single reserve brigade, and the Fr. withdrew, leaving 7200 killed and wounded and 17 guns, the British losses being 5300 men—a high proportion of 20,000. La Cuesta, taking only a minor part, sustained only slight losses.

Talbot, John and Charles, *see* SHREWSBURY, EARLS OF.

Talbot, Richard, *see* TYRCONNEL, EARL OF.

Talbot, William Henry Fox (1800–77), *b.* at Laycock Abbey, Wiltshire. Educated at Harrow and Trinity College, Cambridge, twelfth wrangler. He worked chiefly in mathematics and optics and chemical changes of colour. Discovered the calotype process of photography (*q.v.*) for which he received the medal of the Royal Society, 1842. His photographic discoveries are related in his *Pencil of Nature*, 1844.

Talc, a hydrous bi-silicate of mag-

nesia, which crystallises in the rhombic system (hardness 1, sp. gr. 2.8). Crystals are rare and the massive form 'steatite' or 'soapstone' is more common. Fr. chalk, potstone, and figure-stone are all varieties of T. It is used as a lubricant, for making ornaments, and as fire stones in furnaces.

Talca, a northern prov. of Chile, with an area of 5622 sq. m. and a pop. (1929 est.) of 227,922. Talca, the cap., is an important trade centre. The principal industry is the manuf. of woollen 'ponchos', which are specially famous for their beautiful colours and durability. Pop. 36,079.

Talcahuano, *see* CONCEPCION.

Talegallus, *see* BRUSH TURKEY.

Talent (Lat. *talentum*; Gk. *τάλαντον*, weight), a unit of weight adopted by the Gks. from the Babylonians. The same unit, or derivatives of it, became common throughout Syria, Egypt, and the Hellenic colonies. As gold and silver were not coined before about 700 B.C. the use of the balance for weighing out precious metals led to the employment of the unit of weight as a unit of value. Hence the term T. persisted as applied to money throughout the E. Mediterranean dists. The T. of Scripture may, however, be taken as roughly equivalent to £400 or 1920 dollars. Its use to denote intellectual gift is derived from the parable of the Ts.

Tales. If for any reason a sufficient number of jurors do not appear at a trial, the judge can at the request of either party 'award a *tales de circumstantibus*' of persons present, *i.e.*, join to the jury anyone he chooses. This practically never occurs, for the full complement of a special jury would always be made up from the common jury panel, and of a common jury by taking some common juror in waiting from another court.

Talé-Sap, or Tonlé-Sap (literally, inland lake), a lake of Indo-China, situated partly in the N.W. of Cambodia and partly in Siam. During the summer monsoon the lake has an area of 800 sq. m. and is about 50 ft. deep, and is fed by a branch of the Mekong R., but in the dry season its area measures barely 100 sq. m., with a depth of 4 or 5 ft.

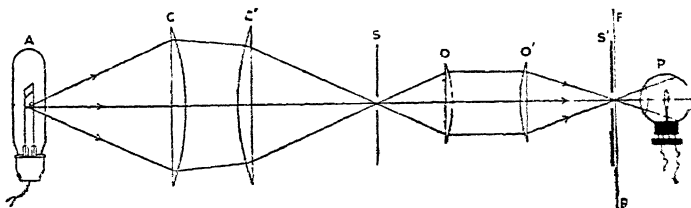
Talfourd, Sir Thomas Noon (1795–1854), an Eng. judge and author, *b.* at Reading. His writings include: *Ion*, 1835, a tragedy produced by Macready; *The Athenian Captive*, 1837; *The Castilian*, 1853; *Letters of Charles Lamb*, 1837; and *Final Memorials of Charles Lamb*, 1849–50.

Talien-Wan (called Dalny by the Russians and Dairen or Tairend by the Japanese) port, of the Liao-tung Peninsula, Manchuria, on a bay of the

same name on the eastern side of the peninsula, about 40 m. distant from Port Arthur. It was leased, together with the latter, to the Russian gov. in 1898, nominally for a period of twenty-five years; it was used as a naval depot, barracks, etc., and at this time the important port of Dalny was formed. It figured prominently in the Russo-Japanese wars, in naval actions, and in 1904 it fell into the hands of the Japanese, the lease being transferred to Japan by the Portsmouth Peace Conference, 1905. In 1915 the Chinese extended the lease to 99 years. It is now the Japanese seat of administration for the territory of Kwantung. The port has a fine harbour ice-free all the year round and protected by a breakwater 1000 yds. long. There is rail communication with Mukden, and with the Eastern Chinese Railway system. Pop. 204,000.

Taliesin, a late sixth-century British bard, to whom is attributed the

films, known as the 'variable-width' method and the 'variable-intensity' method respectively. (a) *Variable-width* method. Two films are prepared; one is the ordinary photographic record of the action and the other is the 'sound record.' A microphone (*q.v.*) is situated so that it receives the sound-waves caused by the speech uttered by the actors. The sound energy is thereby transformed into electrical energy, the fluctuations of the electric currents in the microphone circuit corresponding exactly to the fluctuations of intensity, quality, and pitch of the actor's voice. The microphone circuit includes a delicate indicator that vibrates in sympathy with the fluctuating current and causes a spot of light to move to and fro across the field of view of an ordinary cinematograph. This film, when developed as a positive, is a narrow strip crossed by striations of *variable width* corresponding to the to-and-fro



DIAGRAM

collection of poems known as *The Book of Taliesin*, printed in Skene's *Four Ancient Books of Wales* (1868). The poems are, however, of later date than the sixth century, and T. is held by some to be a purely mythological personage. Consult Stephens' *Literature of the Kymry*, 1849.

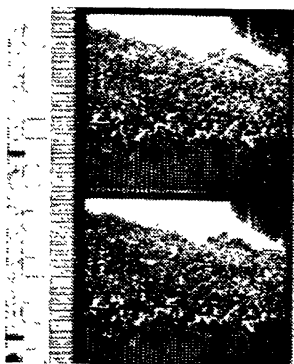
Talisman, a charm engraved with suitable figures at some special time when the conjunction of the stars is propitious, which has the faculty of preserving its wearer from disease, etc.

'**Talkies**' (Sound motion pictures). The telephone was a by-product of the discovery that sound energy could be converted into electrical energy and *vice versa*. The discovery of the photo-electric effect described in the article on PHOTO-ELECTRICITY, whereby light energy may be converted into electrical energy and *vice versa*, is proving to be the most important scientific discovery of the present century from the point of view of the commercial world. One of the by-products of the photo-electric effect is the production of T. or sound motion pictures. There are two methods of production of these

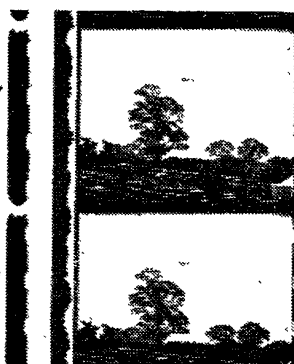
movements of the spot of light. The films in the two recording cameras are driven from the same motor, in order to obtain exact synchronisation of the sound record and the photographic record. A compound film is then prepared, consisting of the two records mounted side by side. This compound film is the actual talking film. The reproduction of the film is a two-stage process. The film first passes in front of the condenser of the projecting lantern arranged so that only the photographic record is thrown on the screen. The film then passes into the sound projector, arranged as shown in the diagram. A is a tungsten arc lamp, the light from which is condensed by the condenser CC' so as to illuminate a lateral slit in the diaphragm S. An image of this slit is formed on the gate in the diaphragm S' by means of the lens combination OO'. The film FF' passes between this gate and the photo-electric cell P. The light that enters the cell therefore fluctuates in intensity corresponding to the fluctuations in the width of the 'sound record.' In this way a

fluctuating photo-electric current is produced; this is amplified by means of valves, and the amplified current operates a loud-speaker. The reverse stage is then completed and the sound emitted by the loud-speaker corresponds to the sounds emitted by the actor while performing the actions portrayed on the screen. (b) *Variable-intensity* method. This method only differs from the former in the character of the 'sound record.' Here the sound-record film is illuminated by means of a lamp the intensity of the light of which is controlled by the microphonic current. The illuminated strip on the record is constant in width, but the intensity of the record fluctuates in harmony with

executed its former vibrations, and these transmitted to the membrane gave rise to sound-waves of the same form as the original waves. Tainler and Bell improved this instrument by substituting for the tin-foil a cylindrical wax drum. The first disc records were invented by Berliner; in this form of recording the style travels in a spiral groove, running from the circumference to the centre of a flat wax disc rotating on a horizontal turn-table. The improvements since 1920 that have made the gramophone an instrument acceptable to critical judges of music are threefold, viz., (i) electrical recording, (ii) modern technique in making copies of the original record, (iii) modern methods



VARIABLE INTENSITY



[By courtesy of First National Pathé, Ltd.]

VARIABLE WIDTH

the fluctuations of the microphonic currents. The method of reproduction is identical with that described above.

Talking-Machines. The essential principles of the gramophone and the dictaphone are identical, and they owe their origin to Edison, who invented the phonograph in 1877. This consisted of a cylindrical drum covered with a sheet of tin-foil on which rested a blunt-pointed style. This style was fixed to a membrane situated at the base of a conical mouthpiece. Records were made by speaking into the mouthpiece; the sound waves, being focused by the mouthpiece, set the membrane vibrating sympathetically and the style indented the foil on the rotating drum to varying depths. Reproduction of the recording was obtained by returning the drum to its original position and turning the drum at the same rate as before. The style thus

of reproduction embodied in the gramophones of to-day.

(i) *Electrical Recording* followed the invention of the modern microphone and thermionic valve by means of which it is possible to amplify the feeble fluctuations of the electric currents in the microphone circuit caused by the impact of sound waves on the microphone. Distortion is not completely absent even in the best microphones, but a corrective device known as an 'attenuation equaliser' inserted in the amplifying circuit, reduces it to a minimum. Further, the design of studios to give the natural effects produced by reverberation in a concert hall has resulted in the great improvement of modern recording. The recorder itself is essentially an electromagnet with a soft iron armature pivoted between its pole-pieces. The amplified microphonic currents traverse coils surrounding the armature and cause it to

vibrate sympathetically between the poles of the electromagnet. The armature carries a shaft to which is attached the holder for the style. This electromagnetic recorder is responsible for some of the improvements that have resulted in the uniform response to notes of varying frequencies.

(ii) *Modern Technique of Record Making*.—The original record is a soft wax disc. This is coated with graphite in order to prepare it for the electrolytic bath in which copper is deposited on the record. The shell of copper thus produced is known as the 'master shell,' and it is, of course, a negative of the original record. The master shell is placed in another electrolytic bath and copper is deposited on it until a thick positive shell is obtained. Another negative shell is prepared from the latter, and this is then mounted on a thick copper disc ready for producing the actual copies. The mixture forming the copy is heated to make it plastic, and it is then pressed on the negative by means of a hydraulic press. The final result is the positive copy. The Columbia Company in 1922 discovered that surface noise during reproduction could be almost entirely eliminated by using exceedingly finely ground material for the record surface.

(iii) *Modern Reproduction*.—The improvements effected under this heading include the new designs of tonearms, horns, and electric pick-ups. The chief considerations are the faithful reproduction of the original music and the amplification required for performances to large audiences. It has been found that the type of horn that gives even response to notes of different frequencies is the logarithmic or *exponential* horn, i.e. its longitudinal section is an exponential curve. The reader is referred to Wilson and Webb, *Modern Gramophones and Electrical Reproducers* (1929), and to Wood, *Sound Waves and Their Uses* (1930), for a detailed analysis of the problems involved.

Tallage, a tax of the Anglo-Norman and Plantagenet periods, imposed on the royal tns., boroughs, and demesne lands, and levied by a poll tax assessed at one-sixth of movables. By the statute *de tallagio non concedendo*, 1297 (an unconfirmed draft of the *Confirmatio Cartarum*, which latter document makes no mention of T.), it was provided that no T. should be taken without the consent of the Commons. Notwithstanding the strict legality of imposition, the levy was resisted until parliament abolished the tax in 1340.

Tallahassee, a city, co. seat of Leon

co., and cap. of Florida, U.S.A., 26 m. N. of the Gulf of Mexico; has cotton factories. Pop. (1930) 10,700.

Tallemant des Réaux, Gédéon (1619-92), a Fr. author, b. at La Rochelle. After having travelled in Italy, and taken his degree in civil and canon law, he was in command of the forces in Brittany, but he soon gave his time to literary labours. His chief works are *Historiettes* and *Œdipe*, a tragedy.

Talleyrand-Périgord, Charles Maurice de (1754-1838), was b. in Paris. The effects of a fall when about a year old rendered him lame for life, and he was early destined for the Church. He was sent to the Collège d'Harcourt, and thence to the seminary of St. Sulpice and to the Sorbonne. In 1780 he was appointed general agent of the clergy of France. In 1788 he was appointed bishop of Autun. As bishop of Autun he was a member of the *Etats Généraux* convoked in 1789. He was charged with the important task of preparing the report upon national education, which was read to the Assembly in Sept. 1791. The basis of the system advocated in this report was the secularisation of instruction. All parties agreed that he was the only man whose talents fitted him for the delicate mission to England. He was despatched in January 1792 to attempt to commence negotiations, but he was unsuccessful. After the accession of the Gironde party to office, the attempt to ensure at least neutrality on the part of England was renewed. Chauvelin was sent to England as nominal, and along with him T. as real ambassador. T. was at Paris when the events of Aug. 10 put an end to the monarchy. He fled to England, but the Eng. government, after some time, ordered him to leave the country, and he was obliged to seek refuge in America. In 1797 T. was appointed foreign minister under the Directory. He attached himself to the growing power of Bonaparte. The arrangement of the Concordat with the Pope was accomplished by T., while the Treaty of Lunéville, the Treaty of Amiens, and the Convention of Lyons all bear the impress of the peculiar views of T. T., in 1807, resigned the portfolio of foreign affairs and accepted the nominal dignity of vice-grand-elect of the empire. In 1809 the ex-minister was so unreserved in his condemnation of the Spanish expedition that Napoleon deprived him of the office of chamberlain. When Paris capitulated, the Emperor Alexander took up his residence in the house of the Prince of Benevento. T. now exerted the influence he

possessed over Alexander to obtain the combination of constitutional forms with the recognition of legitimacy. Louis XVIII. saved appearances by insisting upon being allowed to grant the charter spontaneously. T. was sent to the Congress of Vienna in Sept. 1814, where he obtained much more favourable terms for France than she would otherwise have had. T. dictated the proclamation of Cambray. The constitutional monarchy, the object of his earlier wishes, was now definitely established. In his note of Sept. 21, 1815, he protested, as prime minister, against the new terms which the allies intended to impose upon France. His argument



TALLEYRAND

was fruitless. Louis XVIII. bowed to the dictation of his powerful allies; and T. resigned office two months before the conclusion of the treaty. After the revolution of 1830 T. was appointed ambassador to the court of Great Britain, 1830; and he held the appointment till 1835. During these four years T. concluded the quadruple alliance of England, France, Spain, and Portugal, for the purpose of re-establishing the peace of the peninsula. His *Mémoires* were edited by the Duc de Broglie (Paris, 1892; Eng. ed. trans., 1892).

Tallien, Jean Lambert (1769-1820), a Fr. revolutionist, b. in Paris. He was employed successively in a lawyer's and a printer's office, and in 1791 made himself famous as the author of the Jacobin sheet, *L'Ami des Citoyens*, journal fraternal, placarded twice weekly on the walls of Paris. He subsequently became

secretary to the Commune Insurrectionnelle, representative of Seine-et-Oise in the Convention, and member of the Committee of General Security. In these various capacities he took part in the September massacres, the execution of Louis XVI., and the overthrow of the Girondists. T. became president of the Convention (1794), accompanied Napoleon to Egypt (1798), and was captured on his return by an Eng. cruiser. For a time the Eng. Whigs made a hero of him, but he returned to Paris in 1802 and was sent as consul to Alicante.

Tallinn, formerly Revel, the cap. of Estonia, is a fortified seaport on the S. coast of the Gulf of Finland, 249 m. W.S.W. of Leningrad. It consists of two tns., the upper and lower, the latter containing many remains of mediæval times. The principal buildings are the fifteenth-century cathedral, the town-hall, guild-house, and castle, and the churches of St. Nicholas, Holy Ghost, and St. Olaf, the last-named having one of the loftiest spires in the world. Cotton, leather, furniture, paper, etc., are the chief manufactures, and corn, flax, hemp, etc., are exported. There are large shipbuilding yards and distilleries. T. has an excellent harbour, and is one of the chief ports of the Baltic. It was founded in 1219 as a Danish tn., and was annexed to Russia in 1721. Pop. (1929) 132,000.

Tallis, Thomas (c. 1515-85), an Eng. church-music composer, was organist at Waltham Abbey until 1540, and for the next twenty-seven years gentleman of the Chapel Royal, besides being with his pupil, Byrd, joint-organist there. In 1575 master and pupil were granted the monopoly of music-publishing for twenty-one years. The second Prayer Book of Edward VI., issued in 1552, created the demand for new church music, which T. was one of the chief to supply.

Tallow is composed chiefly of tristearin and tripalmitin, the glycerol esters of stearic and palmitic acids. It is obtained from beef and mutton suet by steaming under pressure in iron cylinders. The membrane or tissue is left and the T. or fat solidifies on cooling to a whitish stiff grease which is odourless when fresh, but which on exposure to air acquires a disagreeable smell. T. is used as a lubricant and in the preparation of soap. See SOAP, STEARIN, etc.

Tallow Tree (*Stillingia sebifera*), a Chinese tree which bears yellow flowers followed by small fruits, the seeds of which yield a wax used by the Chinese for making candles. The wood of the tree is very hard and

is used in printing. Another tree (*Pentadesma butyracea*) bears large red flowers followed by edible berries. A thick yellow greasy juice exudes from the tree when cut.

Tally (Fr. *tailleur*, to cut), primarily a piece of wood on which notches are cut to represent numbers or amounts. Formerly it was customary among traders, before the use of writing, to have two such sticks, one kept by the buyer and one by the seller, notched or scored with the amount of goods sold or the money due; and till comparatively late times small publicans and milk vendors kept their accounts in this fashion. The origin of exchequer bills is to be traced to the *tallies* which served the old Norman exchequer department for receipts and simple records of matters of account; and in times of financial stress exchequer tallies constituted accounts either of loans or sums for which that department held itself responsible. An exchequer T. was a squared piece of wood, on the sides of which the 'writer of the tallies' notched the amount lent, the name of the payer and the date; the T. was then cleft longitudinally into two parts in such a way that each part contained one-half of each notch, one part being kept in the exchequer and the other issued to the lender, so that when the issued part was returned to the exchequer (usually in payment of taxes) it could be compared with the retained part. Hence the modern practice with cheques, which, when returned, should *tally* with the counterfoil. Clumsy as this contrivance was, it was effectual in the prevention of forgery, and exchequer tallies were not finally discontinued till 1834.

Tally System, a system of dealing in London and other large tns. by which articles are sold on credit to customers, the latter agreeing to pay the stipulated price by certain weekly or monthly instalments. The goods furnished are generally of inferior quality and the prices exorbitant. The system is open to great abuses, and may often be ruinous to those—chiefly mechanics, workmen, and domestic servants—who resort to tally shops.

Talma, François Joseph (1763-1826), a Fr. actor, b. in Paris, and made his début at the Comédie Française as Séide in Voltaire's *Mahomet* (1787). He founded the Théâtre Français in 1789.

Talmage, Thomas de Witt (1832-1902), an American Presbyterian preacher, b. at Bound Brook, New Jersey. He became pastor of a Reformed Church at Belleville, New Jersey (1856), whence he removed to

Syracuse (1859), Philadelphia (1862) and Brooklyn (1869). He edited the *Christian at Work* (1873-76) and other religious periodicals, and wrote many books, including *Everyday Religion*, 1875; and *From Manger to Throne*, 1895. His printed sermons had a very large circulation.

Talmud, The (Aramaic, instruction), a name given to a collection of works dealing with the laws and ceremonial regulations of late or Rabbinical Judaism, together with a series of commentaries on these works. From this definition it is seen that the T. falls into two parts, known respectively as the *Mishnā* and the *Gemārā*. During the Exile, the Jews were prevented from carrying on the sacerdotal worship of the Temple, and so were unable to carry out the sacrificial law. There sprang up, therefore, schools of men learned in the law, and the observance of the Sabbath and the strict observance of the law took the place of the Temple system. On the return from the Exile, through the energetic action of Ezra the scribe and his supporter, Nehemiah, the Priestly Code was firmly established, and henceforth the observance of the law became the highest aim of the devout Jew. But before observance must come study, and hence arose schools which studied and commented on the law with the greatest care. Until about 100 B.C. these commentators are known as *Sopherim* or scribes. During the first hundred years of our era, however, the commentators are known as *Tannaim* or teachers. The last of these was the Rabbi Jehuda ha-Nasi, and it was he who gathered into a single body all the single pronouncements or *Halakoth* of his predecessors. Though other collections had undoubtedly been made before, it is this one pre-eminently which receives the title of *Mishna*. During the next three hundred years we find two schools of *Amoraim* or debaters, one in Palestine and the other in Babylon. The latter school was the more famous. They occupied themselves in commenting on the *Mishna*, but their comments have sometimes but the remotest connection with the subject. Hence the *Gemara*, or collection of expositions of the *Mishna*, contains a heterogeneous mass of legends interspersed with scraps from every department of the learning of the time. This is especially true of the Babylonian *Gemara*. The Babylonian *Gemara* (completed c. 520) and the T. from the Babylonian T. are far more important than the Palestinian T. in their influence upon the later history of the Jews. The Palestinian *Gemara*, which was completed about the end

of the fourth century, is much less complete, many parts being missing. The best edition of the Palestinian T. is that of Protrkov (1898-1902). There is an Eng. trans. by M. L. Rodkinson (10 vols., finished 1906), and a Fr. trans. by Schwab (1878-90). See also Rodkinson's *History of the Talmud* (1903), and Strack's *Einleitung in den Talmud* (3rd ed. 1901). For a complete account of both works, with a complete bibliography and list of editions, see the *Jewish Encyclopædia*, vol. xii. (1901-06, 12 vols.). A comprehensive selection from the T. has been made by the Rev. A. Cohen, 1932.

Talpa europæa, see MOLE.

Tamaqua, a tn. of Schuylkill co., Penn., U.S.A., on the Little Schuylkill R. Pop. (1930) 12,936.

Tamar, a riv. forming the boundary between the counties of Devon and Cornwall, England, forms the estuary of the Hamoaze at Devonport and flows into Plymouth Sound. Length 60 m.

Tamarind (*Tamarindus indica*), a leguminous evergreen tree cultivated in India and other tropical countries for its hard, close-grained, heavy wood. It bears pinnate leaves and racemes of yellow, red-streaked flowers followed by legumes, the pulp of which is preserved in syrup; it is a gentle laxative.

Tamarisk (*Tamarix*), a genus of shrubs. The common T. (*T. gallica*) has become naturalised on the S. and E. coasts of Britain, where it has been extensively planted to bind and cover sand-dunes. It is evergreen, and the bright green minute scale-like leaves and spikes of rose-pink blooms are borne on drooping reddish or purple branches.

Tamatave, the most important port of Madagascar, faces the Indian Ocean, 140 m. N.E. of Antananarivo. Coral reefs nearly encircle the harbour. The tn. is connected with Antananarivo by rly., and with the other ports by coasting steamer. The exports consist chiefly of animal products. There is a large meat-preserving factory here. Pop. (1926) 15,022.

Tamaulipas, an Atlantic or Gulf state of Mexico, has an area of 32,128 sq. m. and a pop. of 249,253. Inland the surface is mountainous, dipping towards its lagoon-fringed shore on the Gulf of Mexico. There are large cattle ranches, and cattle and their products are exported. Cap. Victoria.

Tamayo y Baus, Manuel (1829-98), a Spanish dramatist whose parents were both actors. He began to take an interest in playwriting at an early age, and as his dramas were favour-

ably received from the first, he soon resigned a position he held in the gov. in order to devote himself to dramatic art. He was a member of the Academy of Madrid. Principal plays are *La Locura de Amor*, *Virginia*, *La Bola de Nieve*, and *Els de Agosto*.

Tambour, see EMBROIDERY.

Tambourine, a percussion instrument consisting of a vellum head over a circular wooden frame in which 'jingles,' i.e. small cymbals loosely working on a centre-pin, are inserted. Played by rapping or rubbing with the hand, or by shaking.

Tambov: (1) A district of Central Russia, bounded on the N. by Vladimir and Nijni-Novgorod, on the E. by Penza and Saratov, on the S. by Voronezh, and on the W. by Orel, Tula, and Rязan. It covers an area of 25,710 sq. m., and its surface is fertile, comprising wide valleys and plains, cut by deep ravines, while there is much forest-land in the W. The rivs. are the Moksha and the Tsna, tribs. of the Oka, and the Voronezh and Khoper, tribs. of the Don. Coal, iron, limestone, gypsum, and clay are found. The crops are wheat, oats, rye, barley, potatoes, etc.; hemp and flax, tobacco, and beetroot are grown. The chief commercial tns. are Tambov, Kozlov, Morshansk, etc. Pop. 2,700,000. (2) The cap. of the above gov., stands on the Tsna, and has a great grain trade and cattle mart. Pop. 52,942.

Tamariane, see TIMÛR BEG.

Tamil, a Dravidian language, spoken in S. India by over sixteen million people. The area over which it is spoken extends roughly from the city of Madras to the N. of Ceylon. It is closely akin to Malayâlam, Kanarese, and Telugu. The earliest records of Tamil date from the eighth century A.D. Consult Caldwell, *Comparative Grammar of the Dravidian Languages* (2nd ed.), 1875; G. U. Pope, *Handbook of the Ordinary Dialect of the Tamil Language* (7th ed.), 1926.

Tamise, or Teemschi, a tn. of E. Flanders, Belgium, on the Scheldt, near Ghent, with a lace-making industry and manufs. of cottons and woollen goods. Pop. 13,156.

Tammany Hall and Society. A huge New York party organisation established in 1789 and supported by the large miscellaneous population of more or less illiterate foreign immigrants to, and other less reputable elements in, New York City, which, by the corrupt manipulation of the alien vote and the most unscrupulous party tactics, gradually secured the complete control of the

municipal government of New York. It was established as the Columbian Society, soon after Washington's installation as president, by an Irish-American, William Mooney, for social and charitable purposes. In 1805 it adopted the title of Tammany Society (apparently from the name of an Indian chief, Tammanena). With the rapid increase of its membership, twenty-five years after its foundation it espoused politics, and definitely allied itself with the Democratic party of New York; and with the help of the huge heterogeneous mass of Irish, Jewish, Russian, and German immigrants soon acquired (1836) an overwhelming influence in city politics. Favouring causes of its malign progress were the removal in 1842 of all restrictions on the city suffrage, the transfer to the people of the election of judges, and, generally, the corrupt nature of the new City Charter (1857), which vested all the chief administrative functions in the mayor and city departmental heads, and the power of raising and appropriating revenue to a joint body of the state legislature and a board of supervisors.

The *Deus ex machina* of Tammany Hall was William Marcy Tweed (q.v.), a chair-maker, and later foreman of one of the city volunteer fire companies. In 1850 he became alderman of the common council of the city, amassed wealth by speculation, and eventually managed to get elected as district member in Congress, where, however, he proved a failure. Having obtained the post of public school commissioner in New York, and being elected to the Board of Supervisors, he became a member of Tammany Hall, and very soon permanent chairman of the general committee. Such social qualities as Tammany Hall then still possessed soon disappeared under the régime of Tweed and his satellites—Sweeny, a lawyer of obscure origin; Oakley Hall, an American lawyer who had acted as lobbyist in the state cap., Albany; an auctioneer named Richard Connolly, and later, Albert Cardozo, a Portuguese Jew from the rival Democratic organisation, Mozart Hall. This latter organisation of the demagogue Fernando Wood, coming over to Tammany Hall on the elevation of Wood to Congress, left Tammany undisputed 'boss' of city politics. Through the machinations of Tammany Hall Cardozo was elected to one of the chief city judgeships, while George Barnard and John McCann of the Tweed group were awarded two important posts under him. By the most astonishing frauds of naturalisation and false

registration, the proletarian electorate was increased from 10,000 to about 40,000, with the result that the Tammany ring easily secured the election of its chiefs to all the head offices of the city. The control of municipal funds by the abolition of the Board of Supervisors and the transfer of the powers of that body to the recorder and aldermen gave the Tammany ring every opportunity to pillage the city treasury by projecting huge municipal schemes at exorbitant cost, making the most dishonest jobbing contracts by auditing the accounts of the old Board of Supervisors in such a way as to make it appear that large claims were outstanding against that board, and finally by inviting the contractors for the new county court house to add large sums to their bills, which were then promptly appropriated by Tweed and his accomplices. The city debt increased from \$36,000,000 in 1869 to \$97,000,000 in 1871, and there was next to nothing in the way of municipal improvements to justify it.

Tammany Hall suffered a severe blow in 1871 at the hands of a disaffected member named O'Brien, who 'gave the show away' to the *New York Times*. After the publication of details, Samuel J. Tilden, chairman of the Democratic party in the state (afterwards governor), conducted a vigorous campaign against the ring, with the result that Tweed was put on his trial and sentenced to twelve years' imprisonment. Hall was tried three times, but managed to escape conviction. Connolly fled, and the ring was broken. Its later history is associated mainly with the name of Richard Croker, one-time keeper of a liquor saloon and a clerk under Tweed. Croker held no civic office, but as chairman of the Tammany sub-committee, controlled all the city officials, and indeed inspired all the city legislative proposals at Albany. Its present organisation is held together by about one thousand voting dists. each under a 'captain' nominated by the Tammany committee, who nurses the voters, while the committee members of the society are annually elected by the different 'assembly districts' in the city boroughs. According to Mr. Bryce, the city mayoralties between 1902 and 1910 gave the city a purer and more efficient administration than it had previously enjoyed, and although the police and police magistrates and certain government departments may still be open to serious criticism, the political horizon of New York is 'bright enough to encourage the hope that the clouds which remain will ultimately pass

away.' Of late years it has been claimed that T. is a greatly reformed organisation, but an investigating committee set up by the state legislature in 1931 was occupied throughout 1931-32 in probing into various charges of civic mismanagement. See Bryce's *American Commonwealth*; Cambridge *Modern History*; Tilden's *Origin and Fall of the New York Ring*; M. R. Werner's *Tammany Hall*.

Tammerfors, or **Tampere**, a tn. of Finland, 102 m. N.W. by N. of Helsingfors. It is the chief industrial tn. of Finland, and has manufactures of cotton, linen, paper, and woollens. Lumbering is also carried on. It was the scene of disturbance during 1918. Pop. (1928) 54,015.

Tammuz or **Thammuz**, the Assyrian god to be identified with the Gk. Adonis. He represents the decay and growth of natural life, descending part of the year into the nether world and being rescued from there by his sister, the heaven goddess, Innini or Ishtar, the Phœnician Astarte (q.v.).

Tamp, to ram packing, such as clay, earth, etc., on top of a charge of powder in a blast-hole drilled in the rock, etc. The word is also used of ramming down road-metal, etc. T. work in civil engineering is a road made smooth by tamping.

Tampa, a city of Florida, U.S.A., the co. seat of Hillsboro' co., 240 m. S.W. by S. of Jacksonville. Being seated on Tampa Bay, it has become a popular winter resort, notwithstanding its large trade in phosphates and other products. Of its many manufactures, that of Havana cigars takes first place. Pop. 101,161.

Tampico, an important port of Tamaulipas, Mexico. It is in the tropics, just S. of the Tropic of Cancer, on the R. Panuco which runs into the Gulf of Mexico, and the tn. is situated some 7 m. from the bar. It is almost entirely surrounded by water, there being swamps and lakes in the immediate vicinity. The climate is trying from a European's point of view, as sanitary conditions are elementary and malaria is very prevalent. There is steamship communication with the U.S.A. and Europe. T. has no natural resources with the exception of oil. There are small manufactures of paint, soap, flour, nails, etc. In the vicinity, corn, sugar cane and many fruits can be raised. T. is the chief port for all imports into the northern part of Mexico and for the export of products from northern Mexico. A wireless station has been established on Lobos Island off the coast of T., for the purpose of providing the petroleum companies with facilities for sending messages to ships at sea. Pop. 30,000. See the

novel, *Tampico*, by J. Hergesheimer, 1927.

Tamsui, a fort and treaty port of Formosa, Japan, on the N.W. of the island. The port for Taihoku, it trades in rice, tea, sugar and coal. It was bombarded by the Fr. in 1834. Pop. (1927) 23,011.

Tamus (Black Bryony), a genus of perennial climbing plants (order Dioscoraceae) with a large black tuber and a slender twining stem bearing numerous heart-shaped leaves and clusters of small green flowers followed by scarlet berries.

Tamworth: (1) A municipal bor. and market tn. of Staffordshire and Warwickshire, England, on the R. Tame, 110 m. N.W. of London. There are paper mills and clothing manufs., and in the vicinity large market gardens. Coal and fireclay are worked. There is an old castle surrounded by massive walls. Pop. (1931) 7510. (2) A tn. of New South Wales, Australia, in the N.W. Slope dist., on the Peel and Cockburn rivs. It is a farming and pastoral centre, and has also gold and diamond mines. Pop. (1928) 7260.

Tan, or **Tan Waste**, the spent bark from T. pits, formerly and still to some extent used in gardening for making hotbeds and as a material in which pots are plunged. It decays very slowly and has little fertilising value, though it tends to improve the mechanical condition of heavy soils.

Tana: (1) A riv. of Kenya Colony, British E. Africa. Its course of 500 m. is very winding, and its current rapid. It rises near Mt. Kenya. Its banks are low and frequently flooded, and it is navigable, by shallow-draught steamers, for some 150 m. It enters the Indian Ocean about 110 m. N.E. of Mombasa. (2) A riv. of Finnmarken, Norway, formed by the junction of the Anarjokka and Karasjokka. Its course is winding and generally N.E., and it enters the Arctic Ocean by Tana Fjord. Length 250 m.

Tanacetum, see **TANSY**.

Tanager, a name for any bird of the family Tanagridæ, allied to the finches. They are natives of Central America, and nearly all of them have very brilliant plumage. One of the finest is the superb T. (*Calliste fastuosa*); its plumage has a remarkable metallic lustre; the head is sea-green in colour, the breast is violet, and there is a flame-coloured patch on the lower part of the back. It feeds on fruit and insects, and is sometimes kept in an indoor aviary.

Tanagra, a city of anct. Greece, on the Asopus in E. Boeotia, the site, now called Grimádha, being some 3 m. S. of the village of Skimatari. Here the Spartans defeated the Athe-

nians in 457 B.C., but the following year the latter rased its walls to the ground. The statuettes found on the site of T. are characteristic of the best Gk. work in terracotta.

Tanais, see **Don**.

Tanana, a riv. of Alaska, U.S.A., and a trib. of the Yukon. Its source is in the N.W. of St. Elias range, and its direction is generally W.N.W. in the Yukon plateau. It joins the parent riv. on its S. bank opposite the tn. of Tanana. It is navigable for over 300 m.

Tananarivo, or **Antananarivo** ('the Thousand Towns'), the cap. of Madagascar, in the prov. of Ankova, near the middle of the island. It stands on a hill 7000 ft. above sea-level, and it is a well-built city, with houses on European lines. It has schools of medicine, agriculture, commerce, etc., and here is a meat-packing establishment. It has rly. connection with Tamatave and Antsirabe. The tn. is healthy, and has a pop. (1926) of 70,847, of which 3648 are Fr.

Tancred (1078-1112), the crusader who is the hero of Tasso's *Gerusalemme*, was the nephew of Robert Guiscard and the cousin, therefore, of Bohemund: he is sometimes represented as Guiscard's grandson. After taking part in the sieges of Nicæa, Antioch, and Jerusalem, and the Battle of Ascalon (1099), he became prince of Tiberias and Galilee, and for three years (1100-1103) acted as regent of Antioch.

Tanda, a tn. of United Provinces, India, near the R. Gogra, 86 m. N.W. of Benares. Pop. 19,400.

Tanderagee, a market tn. of Northern Ireland in co. Armagh, situated on the Cusher, 5 m. S. of Portadown, with manufs. of linen, yarn, and oatmeal. Pop. (1926) 1321.

Tandy, James Napper (1740-1803), an Irish patriot, b. in Dublin. Secretary of the Society of United Irishmen. His revolutionary ideas brought him into conflict with the government, and he was obliged to take refuge in America. In 1798 he went to Paris, and in conjunction with other refugees planned an invasion of Ireland. They were assisted by the Fr., and landed in Ireland in Sept. 1798. This failed, and T. was sentenced to death: at the intervention of Bonaparte he was allowed to escape to France. See R. R. Madden, *The Lives of the United Irishmen* (7 vols., Dublin), 1812-46.

Taney, Roger Brooke (1777-1864), an American chief justice, b. in Calvert co. His ancestors emigrated to Maryland in the time of Cromwell, and on his mother's side he was descended from Dr. Roger Mainwaring, Bishop of St. David's in the time of Charles I. He was educated

at Dickenson College, Carlisle, Penn.; graduated 1795. Admitted to the Bar in 1799, immediately entered political life and enjoyed the distinction of being the then youngest member of the House of Delegates of Maryland. In 1811 he successfully defended General Wilkinson, then commander-in-chief of the U.S. army, on a charge of treason, before the military court at Frederick, arising out of the suspension by the accused of the *Habeas Corpus* in 1806. In 1812 T., whose political sympathies had till then been Federalist, transferred his adherence to the Republican party under Jackson on account of the Federalist opposition to the war of 1812. In 1816 he was elected to the Maryland Senate, and in 1827 he became attorney-general of Maryland, later becoming attorney-general of the U.S.A., and then chief justice of the Supreme Court of the U.S.A. As chief justice he wrote the opinion in the famous Dred Scott case (q.r.). See also Van Santvoord's *Lives of the Chief Justices, U.S.*

Tanfield, an urb. dist. in Durham, Eng., on the Team, 12 m. N.W. of Durham, with coal mines, stone quarries, brick and tile works. Pop. (1931) 9236.

Tanga, a bay and seaport on the E. coast of Africa, 75 m. N. of Zanzibar. It is the chief port of Tanganyika Territory, it has an excellent harbour and a wide trade. It fell to Gen. Smuts in 1916. Pop. 11,000.

Tangail, a tn. of Bengal, India, 50 m. N.W. of Dacca. Pop. 16,400.

Tanganyika, Lake, a lake of E. Central Africa, situated between 3° and 9° S. It measures over 400 m. in length, and from 30 to 45 m. in width, with an area of 12,700 sq. m. Numerous small bays indent the shores, and many rivs. flow into it. Its only permanent outlet is the Lukuja, which leaves the lake at its W. end to connect with the Congo. Among the principal places on the lake are Ujiji, Kavala, Karema, Pambere, etc. The shores are shared between Gt. Britain and Belgium.

Tanganyika Territory. Bounded on the N. by Kenya Colony and Protectorate, Lake Victoria and Uganda; on the W. by Belgian territory, Lake Tanganyika, Rhodesia, Nyasaland, and Lake Nyasa; on the S. by Portuguese Africa; and on the E. by the Indian Ocean, with a coastline of 500 m. Great Britain received a mandate to administer the colony in 1918 from the Allied and Associated Powers, whose decision was confirmed by the League of Nations in 1922. The mandate lays down conditions directed against slavery, forced labour (otherwise than for essential public works),

usury, and transfer of native land except by the authorities, and enjoining religious freedom and commercial equality. T. T. corresponds in part to what, prior to the Great War, was Ger. East Africa, the rest of which territory, namely the dists. of Ruanda and Urundi in the N.W. and the Klonga area in the S., being entrusted to Belgian and Portuguese administration respectively. T. T. extends from the Umba R. in the N. to the Rovuma in the S. Along the coast lies a plain, varying in width from 10 to 40 m., behind which the country rises gradually to a plateau constituting the greater part of the hinterland. This plateau falls sharply from a general level of 4000 ft. to the level of the lakes—Tanganyika, (2500 ft.), Nyasa (1607 ft.), which mark the great Rift valley extending northwards to Lake Naivasha. The area is 373,500 sq. m., which includes about 20,000 sq. m. of water.

Physical Features.—The highest points in the Territory are in the N.E., where are the extinct volcanoes, Kilima Njaro (19,720 ft.) and Mount Moru (14,960 ft.). In the south-west are the Livingstone Mountains, where the highest peak is over 9000 ft. Portions of the great lakes of Central Africa are included in the Territory, viz., the southern portion of Lake Victoria, the eastern shores of the lower part of Lake Tanganyika, and the northern and north-eastern shores of Lake Nyasa. There are four smaller lakes and numerous rivs.

Climate and Health.—The rainfall, generally speaking, is low for a tropical country and sometimes there are great droughts. There are three types of climate: the Indian or trade wind type, which prevails over the greater part of the Territory, with a rainy season from Dec. to April and its hottest period in November; the monsoon type prevailing in the N.E., with rainy seasons between March and May and in Nov., and its hottest period in Feb.; and the equatorial type prevailing in the N.W., having two warmer and two cooler seasons, the warmer being in Oct. and Feb.—March and the cooler in July and Nov.—Dec., and its rainy season in Oct.—May (Nyanza) or Nov.—April (Tanganyika). The average yearly temperature in the coast region is 78° F. Malaria is prevalent, especially during and after the rainy season; but in the tns. public health departments maintain sanitation at a high level for tropical Africa. Sleeping sickness occurs on the S. and W. boundaries, and relapsing fever is widespread. Yaws, a common native disease, is now receiving mass treatment. Ankylostomiasis (*q.v.*) and

bilharziasis (*q.v.*) occur in low-lying dists.

History.—The Territory was visited in 1884 by Karl Peters, who concluded several treaties with the native chiefs and so paved the way for the Ger. establishment, in 1885, of a Ger. protectorate. In 1889, an Arab revolt having been suppressed, the first Ger. steamer was launched on Lake Nyasa. A more serious rising took place in 1905 and was only crushed after some 120,000 natives had died either during the conflict or from its immediate results. After the Great War (for details of the campaign see AFRICA, GERMAN EAST, CAMPAIGN IN) an Order in Council was issued in Jan. 1919, appointing an Administrator. The Tanganyika Order in Council, 1920, which was read and proclaimed in Dar-es-Salaam on Sept. 25, 1920, constituted the office of Governor and Commander-in-Chief. The Governor is assisted by an Executive Council. In March 1921 the dist. of Ujiji and portions of the dists. of Bukoba and Ufipa, which had formerly been administered by the Belgians, were taken over. In 1920 the draft mandate for Ger. E. Africa was submitted to the Council of the League of Nations in favour of Great Britain and Belgium and approved in 1922. In 1926, by an Order in Council, provision was made for the constitution of a Legislative Council, consisting of the Governor as president, thirteen official members, and not more than ten unofficial members.

Production, Communications, etc.—Sisal hemp is the chief product. It can be planted almost anywhere in the country and was extensively grown under Ger. rule, the maximum Ger. export being exceeded for the first time in 1925. Coffee of excellent quality is grown, especially the *Robusta* variety, which is grown in the Bukoba province and on the slopes of Mt. Kilima Njaro near Arusha and Moshi. Rice is cultivated around Mwanza. Potatoes flourish, generally above a certain elevation. European cereals, fruits, and vegetables can be cultivated in the country N. of Lake Nyasa. Large areas are under cotton in various districts and tea is being tried in some provinces. In 1929, crops under native cultivation were estimated at 3,000,000 acs. under grain, 60,000 under cotton, and 60,000 under ground nuts. Timber forests occur from the rain areas of the mountain ranges to the mangrove swamps of the creeks and riv. mouths. Forestry exports include beeswax, copal, gums, and resins, wild rubber (somewhat declining), mangrove poles and bark, fine woods, ebony, and palm kernels—the most profitable

being beeswax, gums, resins, and mangrove bark. As regards minerals, diamonds, gold, mica, silver, tin, quicksilver, lead, lignite, and others have been discovered. The principal exports are sisal, ground-nuts, coffee, cotton, copra, hides and skins, grain, sim-sim (or sesame), beeswax, ghee, soap, salt, and ivory. Imports comprise cottonpiece goods, food-stuffs, iron and steel goods, machinery, and building materials. Exports were valued in 1929 at £3,988,365 (being seriously affected in that year by drought and locusts) and imports £1,285,952 (cotton being nearly 25 per cent.); the United Kingdom and other parts of the Empire accounted for some 54.9 per cent. of the imports. Revenue (1928-29) £1,972,858, expenditure £2,425,439. Communication is maintained by a number of ocean-going steamers which call in transit, and by coastal services of vessels maintained by the Zanzibar Gov. and by private companies. A large trade is carried on by dhows. The chief ports are Bagamoyo, Kiwa, Mikindani and Pangani; besides a number of lake ports, such as Tirene Bay on Mafia Island, Mwanza, Bukoba, and Musoma on Lake Victoria, Kigoma on Lake Tanganyika, and Mwaya on Lake Nyasa. The Tanganyika Central Railway runs from Dar-es-Salaam to Tabora and Kigoma (772½ m. with a branch to Mwanza); the Tanga or Usambara Railway from Tanga to Arusha (276 m.), this line linking up with the Uganda line via Kahe and Voi. The gauge is one metre, agreeing with that of the Kenya railways. A narrow-gauge line runs inland from Mingoyo near Lindi to Masasi (85 m.). In recent years many bridges have been rebuilt so that the principal roads are again open to traffic. At the end of 1930 there were 72 m. of metalled roads, 11,676 of earth roads, and over 3000 m. of native tracks. Full postal and telegraphic facilities exist at all the principal centres. Valuable work is done in agricultural research and the six govts. of British E. Africa provide among them £10,000 annually supplemented by a grant from the Empire Marketing Board (q.v.). The East African Agricultural Research Station at Amani, formerly the Ger. experimental station founded in 1902, in the Usambara Mts., has been maintained as a great research and experimental station for Brit. E. Africa and the Empire. There are four experimental stations for cotton and general crops, one for general botanical work, and one for veterinary pathology. Pop. (1929): European, 6631; Brit. Indians, Goans, Arabs, etc., 24,414; natives, 4,794,019. Consult *Tan-*

ganyika Year Book, ed. by Gerald F. Sayers, 1931; *The South and East African Year Book and Guide for 1931* (ed. by G. Gordon Brown).

Tangent to a curve is the straight line which passes through two coincident points on the curve. In trigonometry the *T.* of an angle in a right-angled triangle is the ratio of the side opposite the angle to the adjacent shorter side.

Tangerine (*Citrus nobilis*), a small variety of orange with a loose-fitting skin which is allied to the mandarin (q.v.). The fruit is pulpy, but the juice is sweet and fragrant.

Tangermünde, a tn. of Prussian Saxony, seated on the Elbe at its junction with the Tanger, 26 m. N.W. by W. of Brandenburg. Iron-founding, sugar refining, and shipbuilding are its chief occupations. Pop. 14,000.

Tanghinin, a deadly poison extracted from the kernel of *Tanghinia venenifera*.

Tangier, or **Tangiers** (Lat. *Tingis*, Arabian *Tanja*), a seaport of Morocco on a bay of the Strait of Gibraltar, 36 m. S.W. of Gibraltar; is the diplomatic headquarters and the largest commercial city of Morocco. This city lies on the picturesque bank overlooking the Atlantic. The town is surrounded by old walls and dominated by a ruined 'kasbah' (fort). Most of the streets are impracticable for vehicles, and goods are carried by donkeys. The 'Great Sâk' (market-place) is the end of the Saharan and Sudan caravan routes. Exports—chiefly eggs, skins, and tinned fish—were valued in 1928 at 37,782,253 fr., imports at 128,625,862 fr. Cigarette manufacture is the most important industry, and there are fisheries, market gardens, and preserving industries. It is the N. terminus of the Tangier-Fez rly. Pop. (est.) 60,000. T. was taken by the Portuguese in 1471, and held by England, to whom it came as the dowry of Catherine of Braganza, from 1662-84. By the Treaty of Madrid (Nov. 1912) it was to become the centre of an international zone. As the result of treaties and agreements in 1912 and 1923, the country of Morocco is divided into three zones, Fr., Spanish, and Tangier zones. In 1928 the convention between Gt. Britain, France and Spain, providing for a special statute in the Tangier zone, was modified. The T. zone is permanently neutralised and demilitarised, legislative power is invested in an international assembly of 27 members, and a committee of control has a right of veto and certain other powers. In 1928 a native gendarmerie was formed of 400 men, under a Spanish commanding officer and a Fr. second-in-

command. The zone has an administrator, with assistant administrators for health, justice, finance, etc. The area of the T. zone is 225 sq. m. There is an important British colony of about 500 people. The education of Moslems is mainly confined to elementary Koranic schools. Native justice is administered by religious courts, and by the Mendoub, who tries a large number of civil and criminal cases. The revenue comes mainly from customs and consumption duties and amounted in 1923 to 30,963,400 francs. A reserve fund of 4 millions is maintained and is to be devoted to new public works.

Tangle Wrack, or Tangle Seaweed (*Laminaria*), a genus of olive-coloured unjointed seaweeds, some species of which, particularly *L. digitata* and *L. saccharina*, are eaten while young.

Tango, an Argentine dance, now well known in Europe. It is a degenerate form of the Habanera, a slow dance which originated in Havana. The rhythm of the T. is elegant and attractive, although not free from vulgarity. *See also* DANCING.

Tanguts, a tribe which inhabits parts of Kansu, in China, and the Kuku-Nor and Khan districts in N.E. Tibet. They are of Mongolian origin and nomadic in character, their only wealth consisting of their flocks.

Tanis, or Zoan, an ancient city of Egypt, situated 20 m. N. of Tel-el-Kebir. The Tan or Zoan of the Bible, it is mentioned there as having been founded seven years later than Hebron; it was probably the residence of Joseph. About the reign of Rameses II. T. was an important centre of commerce and was noted for its beauty and the fertility of the surrounding country.

Tanistry, in Ireland, an obsolete tenure of lands and the cause of many a family feud, by which the proprietor had a life estate only, to which he was admitted by election. Theoretically the descent went to the eldest or worthiest of the blood of the deceased life tenant. In practice the strongest succeeded.

Tanjore, Tanjur, or Tanjávúr, a tn., cap. of Tanjore dist., Madras, India, 170 m. S.W. of Madras. It has a famous Hindu temple, the old palace of the rajahs and a dismantled fort. The chief manufs. are carpets, silks, jewels, and metal work. It became British in 1799. Pop. 59,913. The district, which includes the delta of the Cauvery R., is very fertile. Area 3727 sq. m. Pop. 2,363,000.

Tankersley, a tn. in the W. Riding of Yorkshire, England, 4½ m. S. of Barnsley. Pop. (1921) 2475.

Tanks. During the Great War

the opposing armies occupied strongly entrenched positions opposite each other, and the ground between them and in the vicinity was ploughed up by incessant shell-fire, any roads being quite impassable for ordinary vehicular traffic. Consequently, owing to this difficulty of movement, coupled with the terrific machine-gun and artillery fire, it was almost impossible to develop an attack of any magnitude without enormous loss. To overcome this, the British began experimenting with a kind of mobile fort consisting of a mechanically propelled vehicle capable of crossing very rough country by the use of caterpillar tracks, which was armoured and carried machine guns and light six-pounders. The name 'tank' was given to disguise the true nature of the machine being secretly constructed, and has stuck to it ever since. The first T. was designed in 1915, being produced in two types, 'male' and 'female.' The general shape was rhomboidal, all round the periphery of which ran the caterpillar-type track, and projections from the sides—'sponsons'—housed the guns. In the Mark I. class, the male carried two six-pounder guns and the female four Vickers machine guns. The tracks were driven by a specially designed six-cylinder petrol engine developing 150 horse-power, through a two-speed gear box under the control of the driver, from which the drive led through a differential to a pair of gear-boxes placed one on each side of the machine. Each of the latter gear-boxes, manipulated by a gearsman, controlled its own particular track by a chain-drive to the rear sprockets. Manned by a crew of eight, these Ts. were very ponderous and slow, having a maximum speed of only 4 miles an hour. In addition, this model had two steel wheels mounted by a hinge at the rear and pressed on to the ground by stout springs. Operated by the driver, these wheels assisted in the steering of the T., but as experience proved them to be cumbersome and not worth the added complication due to their fitment, subsequent models were built without them. After their first use in actual battle, on the Somme in Sept. 1916, the Gers. began to use armour-piercing bullets, which necessitated stronger armour being fitted to the Ts. subsequently constructed. Towards the end of 1916 new and lighter Ts. were being experimented with which were capable of increased speed and manoeuvrability, each being controlled by one man. They were designed to be used beyond the main system of trenches, and as they had not to

negotiate any very wide trenches they were made smaller in length. These came to be known as 'whip-pets,' and later officially as medium Ts. By the beginning of 1918 the ordinary Ts. had been much improved by being fitted with a bigger, better engine of 225 horse-power, one-man control, and able to attain a maximum speed of 12 m. an hour. A short time before the end of the War, designs were prepared for a very much improved type of T. which would be able to travel 20 miles an hour, propel itself, floating, across water, and carry enough fuel to enable a journey of 200 miles across country to be made. One of these was completed after the Armistice, but although its speed was above expectations, the many new devices incorporated in its design were unreliable and proved a source of weakness.

Since about 1925 much attention has been devoted to the development of small, light Ts. which are not costly to manufacture and which are extremely mobile, to be used as a protective screen or as scouts. The outcome has been the production of the light T. weighing 2 tons and operated by only two men: a driver and a machine-gunner.

The tracks fitted to Ts. are of the steel-linked type, but there has been introduced for some other classes of military vehicles a rubber track, and whether or not this latter kind may be fitted to the light Ts. of the future remains to be seen. It cannot yet be stated with certainty which of the two kinds is the more suitable for cross-country purposes. The former has better wearing qualities, has a better grip on wet ground, and a damaged link can be readily replaced. On the other hand the rubber track is cheaper in first cost and runs more smoothly and silently. The principles of suspension are similar in all the types of vehicles under discussion, the weight being taken on bogies consisting of strongly sprung rollers which run along the inside of a track driven by either a driving sprocket or a pulley geared to a rear live axle. Continual experiment has caused considerable modification of the tracks fitted to Ts. since their first construction in 1915. The original tracks were built up of armour-plate track-shoes riveted to track-links joined together by link-pins. Later types were modified to take a steel and wooden 'spud,' which could be bolted to the track shoes in the case of exceptionally bad going. The latest practice is to fit all-steel links, which are either built up or stamped solid. There are three types of bogie used on each track, viz. front, rear, and

main. The front and rear patterns have each two wheels, whilst the main, of which there are five in the modern light T., has four. The weight is carried by the main sets of bogies. The bogie wheels run along the flat upper surfaces of the connecting brackets on the links. Guide rollers carry the track, supporting the weight and preventing any sagging between the sprocket and adjusting wheels, the latter being situated on the front of the track and used for altering the tension of the track. A sprocket wheel, mounted on the stationary rear axle and driven by suitable gearing, drives the track. T. engines have to be of particularly robust construction, owing to the severe strain imposed upon them when in action over rough and broken ground; the load factor under such conditions being in the neighbourhood of 80 per cent., compared with the 40 per cent. factor of ordinary motor lorry engines. They must also be able to function satisfactorily when tilted considerably from the horizontal. An amphibious T. has frequently been suggested as affording a solution of certain tactical problems which have emerged with the development of modern weapons. Vickers-Armstrong have recently designed a two-man light amphibious T., and apparently the design can be adapted to larger types. In appearance it differs but little from the more familiar type; it weighs about 2½ tons, is 6 ft. 10 ins. wide, 13 ft. long, and 6 ft. high. In the water, through which it will 'swim' like a half-submerged submarine, it is driven by a propeller and steered by a rudder. The effect on tactics of the development of such Ts. should be appreciable, for at present deep water is an absolute obstacle to the ordinary T.

Consult Ricardo, *The Internal Combustion Engine*, vol. ii.; *Manual of Military Vehicles* (1930) (Stationery Office); Fuller, *On Future Warfare* (1928); Fuller, *Tanks in the Great War, 1914-18*; Germains, *The Mechanisation of War*; Stern, *Tanks 1914-1918*; Beck, *Tank Construction*.

Tanna, or Thana, the chief tn. of the Tanna dist., Bombay Presidency, India, on the E. coast of Salsette Is. It was a place of importance under the Portuguese, and the cathedral was erected by them. It was taken by the British in 1774. Pop. 15,600. The district, including Salsette Is., has an area of 3570 sq. m. Pop. 882,000.

Tannahill, Robert (1774-1810), a Scottish poet. He was educated in Paisley, worked as a silk-weaver there, and committed suicide by drowning. James Hogg, the 'Ettrick

Shepherd,' visited him in 1810. Many of his songs rank very high, among them being *Braes o' Gleniffer* and *Jessie, the Flower o' Dunblane*.

Tannenberg, Battle of, fought on Aug. 26-30, 1914, in the neighbourhood of Tannenberg and the Masurian Lakes and resulting in a Ger. victory over the Russian armies invading East Prussia. The Russians had planned to deal a counter-blow on the Eastern Front while the Ger. armies on the Western Front were marching on Paris, and the position was critical for the Ger. armies on the Eastern Front until General Hindenburg, who was on the retired list, was called upon to take command, together with General Ludendorff, who was made his Chief-of-Staff in the place of General von Prittwitz, as Commander of the Eighth Ger. Army. The victory established Hindenburg's fame as the greatest of the Ger. leaders, besides disposing for the rest of the war of any serious threat to East Prussia from the Russian quarter. The whole Ger. strategy on the Eastern Front had been frustrated by the defeat of General von Prittwitz at the Battle of Gumbinnen, and it was evident to the Ger. headquarters that they had underrated the strength and determination of the Russians. According to the initial Ger. plan of campaign, when the Great War began, the intention of the Ger. General Staff was to remain on the defensive on the Russian front while the full weight of Germany's armed strength was employed to gain the decision in France. It was expected that the Ger. Eighth Army under von Prittwitz, co-operating with the Austro-Hungarian Armies, would suffice to hold the Russians in check until the victory in France had been won. Moltke hoped to be able to begin the transport of the Ger. divisions from France to the Russian front by mid-Sept., when the combined offensive of the Central Powers against Russia would be set in movement. But during the second week in Aug. it became clear that the Russians were concentrating against East Prussia, the N.E. province of Germany, which juts out towards Russian territory, lending itself to a concentric attack from E. and S. On learning the Russian dispositions, General von Prittwitz brought his divisions, which were scattered along the E. frontier of Germany, northward and assembled them in East Prussia. On Aug. 16, the First Russian Army (Army of the Niemen, under Rennenkampf) crossed the frontier from the E. and marched towards Königsberg, the capital of East Prussia. To meet this offensive General von Prittwitz

formed up his Army for battle on a line N. and S. about the Masurian Lakes, and on Aug. 20 the opposing forces met, and fought what is known as the Battle of Gumbinnen. In the course of this battle, another Russian army (the Army of the Narew), under Samsonoff, also advanced into East Prussia from the S. The Gers. at Gumbinnen were pressed on to Insterburg, the Königsberg Army Corps was hurled back to the shelter of its fortifications, and other Ger. forces further S. were driven back on Allenstein, which fell to General Samsonoff's army. Thus, on the eve of the Battle of Tannenberg, the main body of the Ger. 8th Army was in retreat in two directions, the Landwehr troops to Königsberg, the remainder to the Vistula forts; while only von Scholtz's 20th Corps, with a few Landwehr units drawn from the Vistula, were left to oppose Samsonoff's Army. The countryside was full of fugitives and stories of Cossack brutality. The situation, indeed, was characterised by elements of panic. In these circumstances the Ger. leaders, alive to the fact that the Russian invasion was in reality a gambling move, designed to relieve the pressure on the Allies on the Western Front, decided on a bold counter gamble. They resolved to leave only a cavalry division to hold Rennenkampf's forces and to concentrate all the available Ger. forces for a lightning assault on Samsonoff's Army. The 17th Corps and 1st Reserve Corps were sent southwards to oppose the Russian forces between Sensburg and Allenstein, while the 3rd Reserve Division and 1st Corps were to go round to the S. by train; and other forces were drawn from the Vistula fortress garrisons in order to support the extreme right at Lautenburg. By this plan the Russians were to be attacked by fresh forces on both flanks. The attack was fixed to begin on the 26th, and to the 1st Corps, commanded by von François, who had already proved his qualities against Rennenkampf, was allotted the special task of driving a wedge through the Russian front to envelop the three corps between him and Mackensen's 17th Corps. Time was the essence of the plan and his battalions and batteries were sent straight into action on the 26th as they arrived. This early move proved a successful venture, for, as Ludendorff subsequently admitted, Rennenkampf need only have joined issue and von François would have been overwhelmed; but Rennenkampf was off his guard and his army was marching more or less tentatively and with no assistance

from the mass of ill-led cavalry; by superior military training and organisation were pitted against improvisation and, as often happens in military history, won. The danger to the Russians in their improvised invasion lay in the fact that Samsonoff's Army had advanced across a belt of desolate land, nearly 50 m. broad—a waste of sand-dunes and forest-land deliberately left desolate by the Russians in peace-time without communications either by road or rail in order that it should be a barrier against possible invasion. Moreover, the Russian Army was ill-trained and ill-equipped, and had only reached Ger. soil in a state of hunger and exhaustion. The Ger. troops, on the other hand, were in first-rate condition and were fighting over the country in which they had been trained in peace-time; while the network of good roads and railways enabled their troops to move easily and quickly wherever they were required. All these factors were, of course, fully appreciated by the new Ger. commander and his Chief-of-Staff. The two Russian Armies were under the immediate command of General Jilinsky (with headquarters at Byelostock), who had already indicated Rastenburg as the area in which the two armies were to join forces. Samsonoff, therefore, was to direct his advance towards the line Rastenburg—Seeburg, but his army had lost its bearings by Aug. 26, the right-hand corps, the 6th (under General Blagoveschenski), advancing from Bischofsburg on Seeburg with a wide gap separating it from the 13th Corps (under General Klueff), which latter was marching between the lakes at Lansk towards Allenstein. The 15th Russian Corps, under General Martos, advancing from Neidenburg, had met a Ger. force entrenched along the high ground from Frankenau through Lahna to Orlau on the evening of the 23rd, and after sharp fighting was pursuing it in the direction of Tannenberg. Farther S. was the 23rd Corps consisting of only one division, the 2nd; and beyond it, in front of Soldau, was the 1st Corps under General Artamonov. The Russian communications were so bad that there was little *liaison* between the corps, and their signalling service so inefficient that the Ger. staff had no difficulty in picking up their 'secret' wireless orders. Equally bad was the Russian Intelligence; for no inkling reached Samsonoff of the concentration of troops against him till his two flank corps were heavily engaged. The corps cavalry, consisting of some thirty-eight squadrons, seems only to have reconnoitred the front of the advancing columns at short tactical

distance; and the three cavalry divisions which Samsonoff had at his disposal, also the 4th, 6th, and 15th, were kept on the flanks and took only a minor part in the fighting. As regards the Russian flanks, on Aug. 26, the Russian 6th Corps floundered into the Ger. 17th Corps near Seeburg, and after a day's fighting was routed so soundly that the 4th and 16th Divisions retreated 20 miles, through Ortelburg, and took no further part in the battle. Similarly, the 1st Corps, attacked at Usdau, pushed out of Soldau southwards to Miawa, left a gap between itself and the 2nd Division, through which poured a stream of Ger. troops and artillery. Seeben and Gross Koschlaw were taken by 3 p.m. on the 26th, Usdau on the morning of the 27th, and Soldau by noon on the 28th. Von François then rushed his troops to Neidenburg and through it to hold the main road through Grunfließ and Muschaken to Willenberg. The whole road was picketed by the 29th, and the retreat of three Russian corps cut off. The discomfiture of the Russian flanks was enhanced by the weather and the terrain, which favoured the Gers.; the weather was hot and the dust betrayed the movements of the Russian troops, while the open, undulating country was well adapted to the Ger. artillery. But the centre of the Russian forces was disposed in a closer and more wooded country, which impeded progress, and it was only on the 25th that Samsonoff heard of the defeat of the 6th Corps and realised that his own forces were caught as in a vice. The 13th Corps had actually reached Allenstein on the evening of the 27th, but on the 28th it was ordered southwards again towards Hohenstein, where the 15th Corps, terribly battered, was endeavouring to hold out against von Scholtz's Corps. Still further S. the 23rd Corps was retreating to Lahna. Samsonoff realised that his only hope was to turn the 15th and 13th Corps southwards to flank the 2nd Division in an effort to break through at Neidenburg. But it was too late. Already the rout had begun; disorganised bodies of troops were hurrying eastwards, making helplessly for the shelter of the extensive forest districts of Kaltenborr and Grunfließ, where at least there was temporary respite from sun and shell-fire. Tired out, starving, bewildered, the Russians straggled through the cool shadows of those silent woods; a confused mass of guns and transport plodded along the drives, ankle-deep in sandy dust, heedless of direction, with only one idea, to get away to rest. Some 20,000 men of the 13th Corps, trapped

near Hohenstein in marshy country, surrendered, but the rest of the corps succeeded in reaching the forest land—a fatal refuge. For all the exits were covered by Ger. artillery. Altogether only about 10,000 Russians escaped by one device or another. All the rest surrendered in masses or groups. Some eighty trainloads of guns, wagons, and other material were collected at Puchallowen railway station, and other loads at other stations; of prisoners 90,000 were taken unwounded, 40,000 wounded, and 40,000 men were killed. Samsonoff himself was buried unrecognised at Kl. Piwnitz, S.W. of Willenberg, but whether he died of exhaustion or by his own hand remains unknown. Martos and Klueff surrendered with their staffs on the 30th. It is to be noted that as Ludendorff edits the story of this brilliant victory, the share of Hindenburg in it shrinks to nothing. For an able commentary on Ludendorff's account see 'Who Won the Battle of Tannenberg?' in the *Nineteenth Century*, May 1920.

It is to be observed that there was another Battle of Tannenberg, which was fought in 1410. This battle, called variously the Battle of Grünewald or, more usually, Tannenberg, was fought between the Teutonic Knights of Prussia on one side, and the Poles and Lithuanians on the other, and it resulted in a great victory for the latter, marking the emergence of Poland as a great Power.

Tannhauser, a legendary Ger. knight, sometimes identified with a minnesinger of the thirteenth century, who roved about the country. The legendary T. was also a wanderer, and finally came to the Venusberg or Hürselberg, near Eisenach, where he abandoned himself to the sensual pleasures of the court of Lady Venus (Frau Hulda). Later he repented, was allowed to leave the court, and went to Rome to beg pardon from the pope. Pope Urban said the forgiveness of his sins was as impossible as for his staff to blossom, and T. returned to the Venusberg, and could not be found when the pope's rod began to sprout in three days. Wagner has treated the story in his well-known opera of this name, which differs from the original legend.

Tannic Acid, or **Tannin**, $C_{12}H_{10}O_6$, occurs in gall nuts and all kinds of bark. It is extracted by boiling water and is an almost colourless, amorphous substance readily soluble in water. Its solutions possess a very astringent taste and with ferric chloride give a dark blue solution, and hence tannin is used in the manufacture of inks. T. is the anhydride of

gallic acid, since it is converted into this acid by boiling with dilute sulphuric acid. Owing to its property of forming insoluble coloured compounds with many dyes, T. is used largely as a mordant and is also extensively employed in 'tanning' (see **LEATHER**). In medicine T. is employed in cases of diarrhoea, hæmorrhage, etc.

Tanning, see **LEATHER**.

Tansa, a riv. in Thana dist., Bombay, India, whose waters have been enclosed by a dam. Since 1892 Bombay, 60 m. distant, has been supplied with water from this source.

Tansy (*Tanacetum*), a genus of composite plants with much-divided leaves and solitary or corymbose yellow flower-heads. The only British species is the common T. (*T. vulgare*), which is often abundant in waste places. The plant is bitter and aromatic, and has been employed as an anthelmintic. It was formerly used in the preparation of various dishes, notably T. pudding, a complicated mixture of herbs and food-stuffs.

Tantah, a tn., cap. of Gharbiyeh prov., in the Delta, Egypt, 54 m. N.N.W. of Cairo. It is noted for its Mohammedan festivals. Pop. (1927) 90,916.

Tantallon Castle, a ruin on the N. coast of Haddingtonshire, Scotland, 3 m. E. of N. Berwick. It stands on a high precipice fronting the Bass Rock, and was the stronghold of the Angus Douglasses, from whom it was taken by the Covenanters in 1639. It was further destroyed by Monk, 1659.

Tantalum, a metallic chemical element, symbol Ta, atomic number 73, atomic weight 181.3. It occurs associated with niobium in the mineral 'tantalite' or 'columbite.' It is white in colour (sp. gr. 16.8) and can be drawn into wire of great tenacity and high fusing point (2850° C.). It was formerly used in constructing the filaments of electric lamps, but has now been replaced for this purpose by tungsten (*q.v.*). It is, however, used in the manufacture of acid-resisting chemical apparatus, and in electrical rectifiers. The pentoxide is obtained when the metal is burned in air. Two oxides, however, are known, viz. TaO₅ and Ta₂O₅. The latter gives rise to the tantalates corresponding to the nitrates and metaphosphates. A characteristic salt is potassium fluo-tantalate, the potassium salt of hydro-fluotantallic acid (H₂TaF₇), the latter being readily formed by solution of the pentoxide in hydrofluoric acid. The metal has been prepared from this salt by reduction with hydrogen followed by fusion 'in vacuo.'

Tantalus, a legendary Gk. hero,

son of Zeus and Pluto, and king of Sipylus, father of Pelops and Niobe. He was admitted to the table of the gods, but abused this privilege and was cast into the lower world, where he stood in water which ebbed away when he stooped to drink it. Above his head hung huge branches of fruits which swung out of his reach whenever he tried to grasp them. With reference to this legend, a spirit-stand in which the decanters are visible, but under lock and key, is called a T.

Tantalus, or **Wood-ibis**, a genus of wading birds of the Stork family (Ciconiidae).

Tantia Topi (c. 1819-59), the most brilliant of the native leaders in the Indian Mutiny. He was the successor of Nana Sahib, and on him the shame of the Cawnpore massacre chiefly rests.

Taoism, see **LAO-TSZE**.

Taormina (ancient *Tauromenium*), a tn. and winter resort, Messina prov., Sicily, 30 m. S.W. of Messina; was founded by the Gks. (c. 398 B.C.), and has the ruins of a magnificent theatre. Pop. (est.) 5000.

Tap: (1) The device for allowing liquids to be drawn from containing vessels; simply a plug, spigot, or faucet. Also commonly applied to the cock, by turning which liquids are shut off or their flow is regulated in a pipe. (2) Screw-taps are male screws, commonly in their grades for cutting the female screw in a hole previously drilled; the taper, middle, and plug taps are used in succession.

Tapachula, a tn. in the state of Chiapas, Mexico, 102 m. S.S.E. of San Cristobal, near the Guatemalan frontier, is the centre of a coffee-growing district. It has an active trade. Pop. 9140.

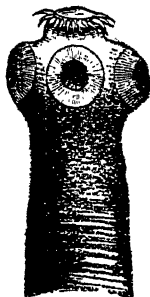
Tapajoz, a riv. of Brazil, is formed by the confluence of the Arinos and the Juruena in the state of Matto Grosso, and flows in a N.E. direction for 1100 m. to its junction with the Amazon near Santarem. Navigation is impeded by waterfalls.

Tape Machine, see **TICKER**.

Tapestry (Fr. *tapis*, a carpet or table-cloth; Lat. *tapetum*, a carpet), a kind of fabric woven with a needle on canvas in wool or silk, sometimes enriched with gold and silver, used as a covering for the walls of a church or room. The term is sometimes used in a more extended sense to include coverings of furniture or carpets (see *Comedy of Errors*, act iv. scene 1). The use of the loom for the production of richly ornamented fabrics is derived from the Orient; many tapestries also appear to have been worked by hand. The curtains of the Tabernacle in the O.T. were probably worked in silk and gold. There is evidence to show that T. was much in favour

among the Egyptians, and its practice was with the Babylonians connected with the exercise of their religion. The Ts. purchased by Nero for 2,000,000 sesterces were of Babylonian origin. The Gks. and Roms. were also much addicted to the working of cloths in this way. Homer mentions several Ts., of which the most famous is that worked by Penelope in the *Odyssey*. During the Middle Ages Ts. were employed for the decoration of churches, and in the twelfth and thirteenth centuries began to be used for private houses also. The latter use is said to have been due to contact with the East in the Crusades. In the fourteenth century the famous Flemish and Fr. Ts. began to be made, those of Arras becoming very celebrated. Louis XIV. in 1666 helped to establish the 'Hotel Royal des Gobelins,' where the beautiful Gobelins Ts. were made till the end of the eighteenth century. The Bayeux Ts. are much earlier, and are said to have been worked by the consort of William I. to commemorate the conquest of England. T. is made to-day in much the same way as from the earliest times. A distinction is made between low-warp work, in which the weaver has the T. before him as on a table, and high-warp work, in which it is suspended as a veil. The warp being so stretched, the design is traced and then worked by hand with a needle. See M. B. Huish, *Samplers and Tapestry Embroideries*, 1913; H. C. Candle, *The Tapestry Book*, 1913; J. J. Guiffrey, *La Tapisserie*, Paris, 1905; A. H. Christie, *Embroidery and Tapestry Weaving*, 1924.

Tapeworm, or **Cestode**, a class of parasitic flat-worms generally characterised by long, flat bodies and the absence of a digestive system. They form two groups, the *monozoa* or unsegmented cestodes, and the *merozoa* or segmented cestodes, which include the larger number of varieties. A segmented T. consists of a *scolex* or head, which bears suckers or hooks by which the animal attaches itself to the intestines of its host, a narrow neck, and numerous segments or *proglottides*, each of which is usually provided with generative organs, so



HEAD AND NECK
OF A TAP EWORM

that it is capable of independent existence and of reproduction when detached from the parent animal. The eggs are oval or spherical, and develop in the uterus into an embryo furnished with six hooks. When the embryo is swallowed by the fish or other animal which serves as intermediate host, it develops into a hydatid or bladder-worm (*q.v.*), containing its scolex invaginated or folded inwards. When the hydatid cyst reaches the final host, the scolex is everted, attaches itself to the wall of the intestine, and proceeds to develop and throw off proglottides. The *Ts.* parasitic in man are *Tenia saginata*, from imperfectly cooked beef, *Tenia solium*, from pork, and *Dibothriocephalus latus*, from fish. They lead to anemic conditions and intestinal disturbances. In most cases they may be expelled by extract of male fern, taken after the intestines have been well purged.

Tapioca, see CASSAVA.

Tapir (*Tapirus*), a genus of ungulates allied to the rhinoceros, but with a short, movable trunk, four front toes, and no horns. The skin is hairy and very thick, and the tail is rudimentary. They frequent forests and are nocturnal in habit, living chiefly on vegetable matter, though probably omnivorous. Of the five or six living species, one, the largest, is Malayan, and the rest occur in S. America, where they are often hunted. There are black in colour, but the Malayan species has dirty white hindquarters. Though powerful they are shy and inoffensive and are easily tamed, and their use in suitable countries as beasts of burden has been suggested. The thick hide is, however, of great value.

Tappet, a projecting piece on a revolving shaft or any other moving piece, so placed as to engage at intervals with a lever controlling some intermittent action. In automobiles and certain types of stationary engines *Ts.* are used to operate valves.

Tapping, in surgery, an operation occasionally performed for the purpose of drawing off an accumulation of dropsical fluid. A puncture is made through the overlying tissues and a small tube is inserted. The fluid then releases itself by its own pressure, or may be withdrawn by suction.

Taprobane, see CEYLON.

Tapti, a riv. of W. India, rising at an altitude of 2500 ft., in 20° 6' N., and 78° 21' E. Its length is 440 m., and it flows into the Gulf of Cambay.

Tar is a dark brown or blackish viscous liquid obtained by the destructive distillation of coal, shale, or wood. The principal kind of *T.* is coal

T., and is described under that head. Wood *T.* is obtained chiefly from firs, pines, and larch trees, and is collected in cavities beneath the heaps or 'meilers' in which charcoal is prepared. It is a thick, harsh-smelling liquid which is acid, due to the presence of acetic acid (pyroligneous acid), and contains paraffins, resins, etc. Creosote, paraffin, and pitch are produced from the *T.*, which is used for wood and rope, etc. Wood *T.* is used medicinally in the preparation of ointments for skin diseases. About 20 per cent. of the products of the distillation of coal in coke ovens is liquid and goes to make up a kind of *T.* very closely resembling coal *T.* Blast furnace *T.* yields phenols, hydrocarbons, and paraffin wax. Peat and lignite also form *T.* on destructive distillation.

Tara: (1) The name of an isolated hill (507 ft.) in co. Meath, Ireland, which is famed in anct. Irish history, and upon the summit of which is a stone, regarded as the stone of destiny, upon which the kings of Ireland were crowned. It was a royal residence until 560, and in 980 the Danes were overthrown here. In 1843 one of Daniel O'Connell's mass meetings in support of legislative union repeal was held here. (2) A tn. of Asiatic Russia, in the Siberian Region Proper, on the Irtysh, 244 m. S.E. of Tobolsk. It has an export trade in furs, and cattle-breeding is carried on. Pop. 10,600.

Tara Fern (*Pteris esculenta*), a common fern of the Australian region allied to the British bracken. Its root stock is eaten by pigs, and when roasted is a favourite food of the aborigines.

Tarai, a dist. in the Kumaun div. of the United Provinces of India. It covers an area of 776 sq. m., and (as its name implies, 'moist land') it is most unhealthy. It is watered by the Deoha R. Pop. 120,000.

Tarakai, a large island of the Pacific off the coast of E. Siberia, Asia, between the Sea of Okhotsk and the Bay of Aniva, separated from the continent by the Gulf of Tartary.

Taranaki, a dist. lying in the S.W. of the North Is., New Zealand, with an area of 3732 sq. m., and a pop. (1926) of 65,820. Formerly forest-clad, most of the ground has now been cleared and is utilised for stock-raising and dairy-farming, much butter and cheese being produced. New Plymouth is the cap. and port.

Tarantism, or **Tarantulum**, an epidemic dancing mania which spread over the greater part of Italy in the sixteenth and seventeenth centuries. The symptoms originated with a great dread of the bite of the tarantula,

which, though sufficient to pierce the skin, is found to be incapable of giving rise to the hysteria and other symptoms of the mania. It is said that the *Tarantella* dance is called after it by reason of the alleged curative efficacy of this rapid measure.

Taranto (the anct. *Tarentum*), a fort. tn. and seaport of S. Italy, in the prov. of Lecce, on the northern extremity of the Gulf of Taranto. It has a fine cathedral, castle, bishop's palace, museum, hospitals, etc. Fishing and oil-refining are carried on, and there is a trade in olive oil, grain, oysters, mussels, etc. The islands of St. Peter and St. Paul, each having a lighthouse, protect the harbour, which is safe and fortified. It is a naval headquarters. Pop. (1929) 121,937. See TARENTUM for history, etc.

Taranto, Gulf of, a gulf of the Mediterranean Sea, bordered by the provinces of Cosenza, Potenza, and Lecce. It has a length of 70 m. and an average breadth of 20 m.

Tarantula, the name for various large, formidable-looking spiders, European and American, but correctly applied to a few relatively small species of the genus *Lycosa*. See SPIDER.

Tarapaca, a prov. of N. Chile, which may be divided into three dists., running from N. to S., parallel with the coast. The dist. nearest the coast has deposits of guano, sulphate of soda, and salt, and copper, silver, and nickel in the mountains; gold has also been found. A narrow strip, 3 m. in breadth and 250 m. long, to the eastward, contains large deposits of nitrate of soda, whilst eastward again stretches the Pampa of Tamangal to the Andes, the only portion of the province where agriculture is practised.

Tarapoto, a tn. of Peru in the dept. of Loreto, 50 m. S.E. of Moyobamba. Straw hats are made here. Pop. 2000.

Tarare (anct. *Taratrum*), a tn. in the dept. of the Rhône, France, 22 m. N.W. of Lyons. The chief industry is the manu. of muslins (introduced in the nineteenth century); silk, plush, and velvet fabrics are also made. Pop. 11,206.

Tarascon, a tn. in the dept. of Bouches-du-Rhône, France, situated on the l. b. of the Rhône, 50 m. N.N.W. of Marseilles. The manufs. include cloth, serge, and silk, soap, etc. It is perhaps best known by Daudet's *Tartarin de Tarascon*. Pop. 8478.

Tarashcha, a tn. of the Ukrainian S.S.R., Russia, 80 m. S. of Kiev city, with flour mills. Pop. 10,628.

Tarasp, or **Vulpera-Tarasp**, a vil. of

Switzerland, in the canton of Grisons, Lower Engadine, 28 m. N.E. of St. Moritz. It is frequented for its mineral baths. Pop. 250.

Tarawera Mt., a peak of New Zealand, situated in the Hot Lakes District of the North Is., 90 m. N.N.W. of Napier. On June 10, 1886, an eruption destroyed the famous pink and white terraces of Rotomahana.

Taraxacum, a genus of composite plants with a milky juice. *T. officinale*, or *Leontodon taraxacum*, is the common dandelion. *T. montanum* is sometimes grown in gardens.

Tarazona: (1) A tn. in the prov. of Saragossa, Spain, situated on the Queiles, 40 m. N.E. of Soria. Pop. 8506. (2) A tn. in the Murcia prov. of Spain, situated 19 m. W.N.W. of Albacete. Pop. 5948.

Tarbagatai, a mountain range in Russian and Chinese Turkestan, extending over 200 m. Its highest point is Muz-tau (11,920 ft.), and the best pass is Say-assu, which leads to Chuguchak.

Tarbell, Edmund C., an American painter, b. April 26, 1862. Studied at the Boston Museum of Fine Arts and in Paris. In 1906 elected a National Academician.

Tarbert: (1) A fishing vil. of Argyllshire, Scotland, situated on Tarbert Bay, 30 m. N.N.E. of Campbeltown, with an anct. castle, erected by Robert the Bruce. Pop. (1921) 1983. (2) A vil., with a corn market, co. Kerry, Irish Free State, on the Shannon R., 6½ m. S.E. of Kilmish. Pop. (1926) 290.

Tarbes, cap. of the dept. of Hautes Pyrénées, France, situated on the Adour R., 12 m. N.N.W. of Bagnères de Bigorre. It has sawmills, tanneries, and potteries, an arsenal and noted markets, especially for horses. Pop. 29,856.

Tarbolton, a tn. of Ayrshire, Scotland, 6 m. E.N.E. of Ayr. Pop. (1931) 5131.

Tarbrush, another name for the fez (*q.v.*).

Tardieu, André Pierre Gabriel Amedée, Fr. publicist, diplomat, and politician, b. Sept. 22, 1876. Educated at the Ecole Normale, in which he greatly distinguished himself. Began his career as a diplomat, but tiring of the restraints, took up journalism and became foreign editor of the *Temps* and editor of the *Revue des Deux Mondes*. His *Bulletins du Jour*, were always reliable, and were eagerly read and cited in foreign newspapers during the Great War. On the outbreak of war he was appointed Chief Censor, but soon resigned the post for the trenches. After being invalided out, he was chosen as France's representative in

the U.S.A. on various questions relating to the War. On the return of Clemenceau as Prime Minister he came back to Paris and was made High Commissioner there for all Franco-American matters. Chosen to be one of the Fr. delegates at the Inter-Allied Peace Conference in Paris in 1919, of which, during Clemenceau's short absence through incapacitation after an attempted assassination, he was acting chairman. After the War, he continued to identify himself with Clemenceau's policy, but preferred to direct the *Echo National* to taking any part in the gov. Strenuously opposed to any revision of the text of the Versailles Treaty. From 1926 to 1928 he was Minister of Public Works and became Premier in 1929 and again in 1930. In 1931 he was appointed Minister of Agriculture, and in Feb. 1932 he formed a new ministry in which he was Premier. Publications: *Questions diplomatiques de l'Année*, 1904 ('crowned' by the Académie Française in 1905); *France and the Alliances*, 1908; *Le Prince de Bulow*, 1909; *Le Mystère d'Agadir*, 1912; *L'Afrique du Nord and L'Amérique en Armes*, 1919; *La Paix*, 1921.

Tardieu, Jacques Nicolas (1718-95), an engraver, son of Nicolas Henri T. He received his artistic tuition from his father, became a member of the Fr. Academy, and reproduced pictures by Nattier, Vanloo, and Boucher.

Tardigrada, Bear Animalcules, or Sloth Animalcules, an order of Arachnida. The name was formerly given to a family of Edentata, containing the sloths.

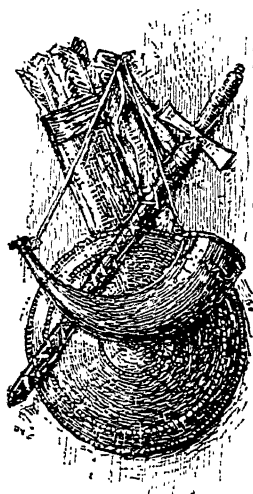
Tare, or Vetch (*Vicia sativa*), a leguminous plant with trailing or climbing stems and compound pinnate leaves and reddish-purple flowers. The tares of the parable (Matt. xiii.) are probably darnel.

Tare and Tret, certain deductions made from the gross weight of merchandise in bags, cases, etc. The weight of the vessel in which the goods are packed is known as the tare, and the gross weight minus the tare is the net weight. The tare may be calculated by weighing a few packages and taking the average (*average tare*); or in some kinds of merchandise the packing cases are assumed to be of a certain usual weight (*customary tare*); or the *actual* tare may be ascertained. The allowance for loss in transit, waste, etc. ($\frac{1}{2}\%$ of the net weight) is known as tret.

Tarentum: (1) (Gk. *Tapás*). A Gk. colony in Italy, situated on the W. coast of the peninsula of Calabria. Its greatness dates from 703 B.C., when the original inhabitants were

expelled and the town was taken possession of by a body of Lacedæmonian Parthenia under the guidance of Phalanthus. After being autonomous until the fourth century B.C., T. was occupied by the Gks., and in 272 B.C. was captured by the Romans. It revolted during the second Punic War, but was retaken in 207 B.C., and was subsequently an ally and (in 123) a colony of Rome. It was taken by the Saracens in 830. (2) A bor. of Allegheny co., Pennsylvania, U.S.A., situated 21 m. N.E. of Pittsburgh. It has manufactures of glass. Pop. (1930) 9551.

Target, or Targe, the name given to the small round shield which was used by the Celts of Ireland and Scotland. Such small Ts. came into very general use as armour ceased to



TARGE, BUGLE, ETC.

be worn. From its similarity to the T., the object at which archers and, later, riflemen, aim at, was also called a T. In archery a T. is a circular frame of straw, painted with concentric rings of 4½ in. width; there are five rings, counting respectively 1, 3, 5, 7, or 9 points. For some time 'match' Ts. of rectangular shape were solely used by soldiers; the 'bull' counted 4 points, the inner ring 3, and either a 'magpie' (a shot in the second of the T.'s two rings) or

an outer, 2 points. 'Service' Ts. which are now used in the British army consist of a brown head and shoulders shown against a dark canvas ground, etc. 'Disappearing' Ts., appearing and disappearing at irregular intervals, are also used. In naval shooting the T. is a large wooden erection.

Targoviste, or Tergoviste, the cap. of the dept. of Dambovitza, Rumania, 44 m. N.W. of Bucharest. It has some interesting old buildings and an arsenal. It suffered severely upon its capture by the Austrians and Gers. in 1916. Pop. 13,185.

Targum, an Aramaic paraphrase of the O.T. There are ten known Ts., the oldest of which is supposed to have been that of Onkelos, which is confined to the Pentateuch. The person and name of Onkelos have been for the last 300 years a *crux criticorum*. According to the Babylonian Talmud, Onkelos (son of Calanicus or Calonymus), the proselyte, composed the T. on the Pentateuch out of the mouths of R. Eli'ezer and R. Yehoshua, who taught in the first and second centuries. In the Jerusalem Talmud the same thing is related on the same authorities, and almost in the same words, of the proselyte Aquila of Pontus, whose Gk. version of the Bible was much used by the Gk.-speaking Jews down to the time of Justinian. From facts seen, some still argue that Onkelos is but another name for Aquila, and that the Gk. translator also wrote one T.

Tarifa (Rom. *Julia Joza* or *J. Transducta*), a seaport in the prov. of Cadiz, Spain, 20 m. W.S.W. of Gibraltar. This tn., whose characteristics are quite Moorish, has a fortress on an island near by. It is engaged in anchovy-fishing. Pop. 12,500.

Tariff (from *Tarifa*, a tn. in Spain, at the entrance of the Strait of Gibraltar, where duties were formerly collected), denotes a list or table of goods with the duties or customs to be paid for the same, either on importation or exportation, whether such duties are imposed by the gov. of a country or agreed on between the govts. of two states having commercial relationships with each other. Before the Great War Eng. policy was to impose only a few duties for purely revenue purposes (see CUSTOMS DUTIES), but prior to the changes of Sir Robert Peel, there were over one thousand dutiable articles. No more stringent protective system, though existing in the interests of revenue, could well be imagined than that of England at the close of the Napoleonic wars in 1815.

Most articles of consumption, together with raw material, were subject to high duties, while foreign manufactures were in some cases prohibited, and in most, if not all, penalised under heavy differential rates. Yet in spite of all these duties, Eng. manufactures prospered, owing to the complete disorganisation of industry on the Continent and the application of inventions (see also TARIFF REFORM). On the Continent up to about 1850 rigid protection or, in many cases, prohibition, prevailed, except in Prussia and Switzerland. The change came with the celebrated treaty between England and France of 1860 (the work of Cobden and Chevalier). The rapid growth of trade between the two signatories to the treaty soon led other European nations to safeguard themselves by concluding a veritable network of treaties, securing a lower scale of duties, and the stringent system at the Restoration of the monarchy in France at last gave place to one of low duties and moderate protection on manufactures and the almost complete relief of raw material from duty. In Germany conditions were always somewhat different; prior to the Zollverein (see CUSTOMS UNION) there obtained among the states of the Germanic Confederation a moderate scale of duties based on the Prussian T. of 1818. Up to 1850 there was a gradual and retaliatory system of Ts., which weakened only after the Anglo-Fr. treaty. After this a treaty was concluded between France and Prussia (1862), which three years later was extended so as to embrace the entire Zollverein. The Franco-Prussian War in its consequences, and a general wave of agricultural depression, caused a reaction to protectionist principles after 1870, and the result was that most European countries, except Great Britain, became protectionist, though Holland and Belgium adhered to the system of moderate duties. Most British colonial Ts. are protectionist, but nowhere perhaps was the contrast between Eng. commercial policy and that of any other great country more marked than in the U.S.A., in which latter country the protectionist principle began with the relief accorded in 1816 to 'infant industries' struggling against the competition of the Eng. manufacturers. The world economic crisis of 1931 and the increasing tide of unemployment everywhere caused the National Gov. of Great Britain to reconsider the free-trade traditions of the country, and import duties of 50 per cent. were placed upon certain articles of foreign manufacture. It was expected that these duties,

which embraced a comparatively small range of articles, would be preserved by a general tariff of 10 per cent. on practically all imports (excepting foodstuffs, cotton and wool) for revenue purposes.

In the U.S.A. a very high protectionist T. obtains. Up to 1931 the average was 30 per cent., while Australia had a 27 per cent. T., India 15 per cent., France and Germany 20 per cent., and the Netherlands only 8 per cent. For a fuller account see PROTECTION.

Consult Bastable, *The Commerce of Nations* (9th ed.), 1923; Gregory, *Tariffs: A Study in Method*, 1922.

Tariff Reform, the name specifically appropriated to the fiscal policy, inspired by Mr. Joseph Chamberlain, which sought to end the long régime in England of free-trade principles, and to replace it by a system of duties on imports. It need hardly be said that when at the close of last century Mr. Chamberlain took up this policy, there was nothing original in the idea of its application to the British commercial system. Rather did it require some fifty years ago all the economic brilliance of Mill, McCulloch, and others, working on the basic principles of Adam Smith, to repel the dogmas of the so-called 'Mercantile System' (q.v.); a mission which was accomplished in such thorough fashion that the policy of free importation which goes by the name of 'Free Trade' (q.v.) remained in principle to 1931, when the economic crisis following the Great War led to the complete abandonment of Great Britain's traditional policy of free trade, though certain modifications had appeared during the War in the form of 'McKenna Duties' and 'Safeguarding' (q.v.), which were regarded as emergency measures, the former in order to economise cargo space in vessels during the Ger. submarine blockade, and the latter as a means of increasing national revenue and to protect what were called 'key industries.' The political exponents of free-trade principles in the early 'forties, when as yet the unrepealed Corn Laws appeared to obstruct every avenue to progress, were Cobden and Bright, the leaders of the 'Manchester School.' A war, however successful in its immediate result, is almost necessarily followed by a period of general distress, and as necessarily gives rise to political expedients to alleviate that distress. During the South African War of 1900 a corn-tax, ostensibly a temporary one, levied purely for war purposes, was imposed by the Conservative Gov. The tax was wholly remitted (1902).

Different Economic Aspects of Tariff Reform.—T. R. endeavours 'to promote imperial union by fiscal methods, which mean the taxation of imports of food, with preferential rates for Empire products'; while, as a set-off to the burden of increased food-prices, it promises the workers that 'their wages will always increase faster than food prices, and they will have constant "work for all."' The weight of Eng. opinion would seem to have been against the assumed benefits of protection or any system of rigid exclusion of all outside competitors up to the time of the sensational return of the National Gov. in 1931. The advocates of reciprocity maintain that free trade is injurious unless other countries adopt it; those of retaliation, that free trade is good in itself, but that 'to revenge the injuries inflicted by foreign duties on us, or to compel their abandonment, we ought to impose corresponding duties on the goods of protectionist countries.' This distinction seems to offer no more than a contrast in motives, and in practical politics the two views are often hopelessly confounded. 'Reciprocity,' says Mr. Bastable, 'assumes that restriction gives advantages to the nation that employs it, at the cost of still greater injury to foreigners,' an assumption based on the belief that trade is lucrative only to importers (the term 'dumping' in connection with the fear of over-importation is used contemptuously to denote the sale of surplus foreign goods at less than the price obtaining in the market of the country of production), a belief which in its turn rests on the old fallacy that the wealth of a country is to be measured by the amount of money in its possession (see CURRENCY, MONEY). It is to be observed that but little support for reciprocity is to be derived from the belief that protective duties fall wholly or partly on the foreigner. The catch-phrase 'make the foreigner pay' takes no account of the probable effect on prices to the consumer. Retaliation, in so far as it differs from reciprocity at all, does so only by reason of the fact that its advocates stoutly maintain their adherence to the principle of free trade, regardless of the fundamental meaning of that principle as expounded by Mill, Cobden, and others, who concur in defending it against all criticism founded on the supposed evils of 'one-sided economy.' Retaliatory duties would not inconceivably result in still higher countervailing duties on the part of the country against which they were directed, a result which would certainly render the

adoption of universal free trade far more remote than ever; and this possibility became particularly prominent following the adoption by Great Britain of a 50 per cent. import duty on many foreign manufactured goods by the Abnormal Importations Act of 1931, while a certain tension between Great Britain and France followed upon the imposition of a 15 per cent. surtax upon British goods in order to counteract the effect of the fall of sterling. To take concrete instances, it is doubtful whether the U.S.A., Canada, France, and Italy have improved their commercial positions by means of retaliatory duties. Prof. Bastable says with considerable force that the strongest reason against the adoption of retaliation by such a country as England, whose imports are mainly food and raw material and exports mainly manufactured articles, is that foreign countries desirous of developing their manufacturing industries would not be deterred by threats of retaliation from a nation so advanced in trade, but would, on the contrary, rather welcome any check on their exports of raw material. The Great War cost a great deal more than any previous struggle, and a general need for greater revenue has been given as the cause of a generally increased tariff rate, though experts differ as to whether the means can ever produce such a desired end. A rising level of prices caused international readjustments, and France and Belgium adopted a system of 'coefficients' whereby rates were adjusted as prices rose or fell. Moreover, the fluctuations of exchange values and the depreciation of currency, together with the departure from a gold standard, added further possibilities to the intricacy in which the question of T. R. has become involved. The fear of 'dumping,' i.e. the excessive importation of foreign goods, gave a fresh stimulus to the adherents of T. R., and, besides England's drastic measure, Spain, Switzerland, and Australia have adopted similar 'anti-dumping' tariffs to meet the trade situation. India offers an interesting study; with the possibility of self-gov. her fiscal policy is likely to be influenced in particular by the great development of Japan's overseas trade, especially in Asiatic countries, and the Report of the Tariff Commission of 1921 indicates a probable leaning to protectionist ideas.

As to the future of T. R. or its converse, free trade, the student is cautioned against regarding any conclusion with confidence in the critical years which follow the Great

War, since the whole period is one of abnormality and, without doubt, most of the protective measures recently adopted by the countries of the world must be viewed merely as emergency measures with a possible modification, whose stringency time and circumstance only can show.

Consult Stanwood. *American Tariff Controversies in the 19th Century*, 1903; Gregory, *Tariffs: A Study in Method*, 1922; Bastable, *The Commerce of Nations*, 1923.

Tarija: (1) A dept. of Bolivia. Industries are stock-raising and agriculture. Area 70,800 sq. m. Pop. 130,000. (2) Cap. of the dept., 180 m. S.E. of Sucre. Pop. 11,000.

Tarik, see GIBRALTAR.

Tarim, the principal river of Chinese Turkestan, composed of the Yarkand-darya, the Kashgar-darya, and the Aksu-darya. The Kouchet-darya, which drains Lake Bagrast Kul, flows into the T., as do the Khotan-darya and the Cherchen-darya when they are not dried up. The T. is a sluggish stream, shallow and tortuous, and after flowing by the side of the desert of Takla Makan, and through the oases of Yarkmakashgar, Aksu, etc., it dies away in the marsh Lop-nor, after a course of 1000 m. The area of its basin is 354,000 sq. m., of which over a half consists of arid deserts, including those of Takla Makan, Gobi, and Kumtagh. The region has been explored by Sven Hedin. See his *Through Asia*.

Tarkington, (Newton) Booth, American author, was b. at Indianapolis, Indiana, July 29, 1869, and educated at Purdue and Princeton Universities. He was a member of the Indiana House of Representatives for the term 1902-03. He then gave up politics to devote himself to writing. He was successful with his first book, *The Gentleman from Indiana*, 1899. It was to be the model for most of his other novels—an optimistic, happy description of middle-class folk of Indiana and the country round about. Among these were *The Two Van Revels*, 1902; *The Conquest of Canaan*, 1905; and *His Own People*, 1907. In another vein were his stories of young people—*Penrod*, 1914, and *Seventeen*, 1916, which won a new success for him. Standing apart in his work is the short novel—as well known in Europe as in America—*Monsieur Beaucaire*, which was published in 1900. Tarkington dramatised it and the play had a long run in the U.S.A. It was also used as the libretto for the popular opera of the same name which was revived in London in the winter of 1931.

Tarlac, or **Tariag**: (1) A prov., Luzon Is., Philippines. The chief

products are rice and sugar. Area 1295 sq. m. Pop. 135,000. (2) The cap. of the above prov., 65 m. N.N.W. of Manila. Pop. 23,000.

Tarlatan, a gauze-like muslin used for ladies' dresses, etc. It occurs in white and colours and is often printed. Tarare, 22 m. from Lyons, is the chief centre of this manuif.

Tarleton, Sir Banastre (1754-1833), the son of a Liverpool merchant, educated at Oxford. He went out to America with Lord Cornwallis at the beginning of the War of Independence. T. held several commands during the war, and was present at the battles of White Plains and Brandywine. He was besieged by the Americans in Gloucester, and was compelled to surrender.

Tarleton, Richard (d. 1588), a comedian, was distinguished for his performance of the clowns of the old Eng. drama. One of his last performances was in *The Famous Victories of Henry V.*; this was in 1588 at the 'Bull' in Bishopsgate Street. T. is known to have written at least one play, *The Seven Deadly Sins*, which, though never printed, and now lost, was much admired. There is a portrait of T. in his clown's dress, with his pipe and tabor, in the Harl. MS. 3885; and a similar one on the title-page of a pamphlet called *Tarleton's Jestes*, 4to, 1611.

Tarn: (1) A dept. in the S. of France, once forming part of Languedoc, an old prov., and bounded on the N. by Aveyron. The chief rivers are the Tarn, Agout, and Aveyron, while it also contains the spurs of the Cévennes. Agriculture is well developed, corn being grown. Its trade is connected with wine, wool, and silk goods, whilst coal, iron, and copper are to be found. Area 2231 sq. m. Cap. Albi. Pop. (1926) 301,717. (2) A river of France, rising in the Cévennes and flowing into the Garonne. The chief tns. on its banks are Albi and Montauban. Length 225 m.

Tarn-et-Garonne, a dept. in the S. of France, originally part of the old dept. of Guienne. The chief rivers are the Garonne, Tarn, and Aveyron. Area 1440 sq. m. Chief products cereals, fruit, and wine. Chief manuifs. woollen and silk goods. Cap. Montauban. Pop. (1926) 164,191.

Tarnopol, a tn. and S.E. county of Galicia, Poland. The tn. is 78 m. E.S.E. of Lemberg. It distils spirits and manuifs. cloth, linen, and flour. It was captured by Austro-Ger. forces in 1917. Pop. county, 1,429,000; tn. 30,900.

Tarnow, a tn. in Galicia, Poland, in the county of Cracow, 164 m. W. of Lemberg, on the Dunajec. The chief building of interest is the cathedral,

and the chief manuif. agricultural implements. Pop. 35,700.

Tarnowitz, a tn. in Silesia, Prussia, 45 m. S.E. of Oppeln. The chief industries are brewing and iron manuif.

Taro, see COCCO.

Taro, see TARA.

Tarois, see CARDS, PLAYING.

Tarpaulin, a large sheet of the coarsest kind of linen or hempen cloth, saturated with tar to render it waterproof. It is used for covering loaded wagons, the hatchways of ships, etc., as a temporary protection from wet. See WATERPROOF.

Tarpeia, daughter of Sp. Tarpeius, the governor of the Rom. citadel on the Saturnian hill, afterwards called the Capitoline. During the Sabine War she was tempted by the gold bracelets which the Sabines wore on their left arms to betray the Capitol to them. But on entering the Sabines gave her not their bracelets but their shields, which they also carried on their left arms, crushing her to death beneath their weight. The Tarpeian rock, a part of the Capitoline, was used as the place of execution for traitors.

Tarpon (*Megalops atlanticus*), a littoral fish plentiful in warm American seas. It grows to a length of 7 ft. or more, and to a weight of over 200 lb., the scales, which are tough like thin horn, sometimes being as much as 5 in. in diameter.

Tarquinius, in anct. geography, a city of Etruria, 45 m. N.W. of Rome, near the modern Corneto. It was the original residence of Tarquinius Priscus, and one of the chief cities of the Etruscan League.

Tarquinius, the name of a family in early Rom. history, to which the fifth and seventh kings of Rome belonged: *Lucius Tarquinius Priscus* (616-579 B.C.), fifth King of Rome, was beloved by his people on account of his wisdom and courage. He defeated the Latins and Sabines, and tradition relates that he also defeated the Etruscans. He was murdered after a reign of thirty-eight years. *Lucius Tarquinius Superbus* (534-510 B.C.), the seventh King of Rome. His cruelty and tyranny obtained for him the surname of 'Superbus.' But, though a tyrant at home, he raised Rome to great influence and power among the surrounding nations. He defeated the Volscians and took Gabii by stratagem. Owing to an outrage committed by his son, Sextus, on Lucretia, the wife of his cousin, Tarquinius Collatinus, Tarquinius Superbus and his family were exiled in 510 B.C. The people of Tarquinius and Veii espoused the cause of the exiled tyrant, and marched against Rome, but they were unsuccessful. T. next

repaired to Lars Porsena, King of Clusium, who marched against Rome, but was induced to make peace with the Romans. Thereupon T. took refuge with his son-in-law, Mamilius Octavius, who induced the Latin states to declare war against Rome, but they were defeated in the Battle of Lake Regillus. T. then fled to Aristobulus at Cumæ, where he died.

Tarragon (*Artemisia Dracunculus*), an aromatic perennial plant, the green or dried leaves of which are used for flavouring vinegar.

Tarragona: (1) A maritime prov. in the N.E. of Spain, bordering on the Mediterranean Sea. It has an area of 2505 sq. m. and a pop. (1928 est.) of 355,588. On its fertile mountain slopes are vineyards and orchards, producing excellent wine and fruit. There is much forest land, yielding valuable timber, whilst copper, lead, silver, limestone, and marble are found. (2) (Anc. *Tarraco*) A seaport and the cap. of the above prov., is situated at the mouth of the Francolí, 45 m. W.S.W. of Barcelona. It stands on an eminence about 600 ft. high, and partly on the low ground beneath it, forming an upper and a lower tn., both of which are fortified. Among its archaeological remains are an amphitheatre, theatre, circus, and aqueduct. It is an archbishop's see, with a fine cathedral and palace. The port carries on considerable trade, but its harbour can accommodate only coasting vessels. T. was originally a Phœnician settlement. Later it was captured by the Goths and ruined by the Moors. Rebuilt in the eleventh century, it has in turn been captured by the Eng. (1705) and pillaged by the Fr. (1811). Pop. 27,883.

Tarragona, a port wine of a tawny type, produced in Catalonia, Spain. It is also the name of an Australian red wine.

Tarrasa, a tn. in the prov. of Barcelona, Spain. The chief manuf. is woollen cloth. Pop. 23,000.

Tarruntenus Paternus, a Rom. jurist, was the author of *De Re Militari*, two excerpts from which are in Justinian's *Digest*.

Tarrytown, a vil. of New York in Westchester co., on the Hudson R., 25 m. N. of New York City, famed as the 'Sleepy Hollow' of Washington Irving's story. He lies buried here. Pop. (1930) 6841.

Tarshish, a place or region which is mentioned several times in the O.T. It was probably the anct. Tartessus, and was situated in Spain near the mouth of the R. Guadalquivir. Tartessus was a noted centre of commerce. See Ezek. xxvii. 12, etc.

Tarsipes rostratus, the Noolbenger, a tiny marsupial, native of Western

Australia. It is arboreal in habit, and feeds largely on honey, which it extracts with its long tongue.

Tarsus, a city of Cilicia in Asia Minor, on the R. Cydnus, represented to-day by the modern Tersus. It is now chiefly remembered for its connection with St. Paul. See Sir W. M. Ramsay's *Cities of St. Paul*.

Taglia, Niccolò (c. 1500-57), b. at Brescia. He was mainly interested in the scientific and mathematical problems of gunnery and the art of warfare, particularly in projectiles. In 1521 he was a teacher of mathematics in Verona, and discovered a method of solving certain cubic equations. His chief works are: *Nova Scientia*, 1537, and *General Trattato di Numero e Misura*, 1556 and 1560, the latter dealing with arithmetic, algebra, geometry, and mensuration.

Tartan, or **Plaid**, a pattern woven in cloth, in which bands of different colours are woven or printed side by side, both the warp and weft way of the material, thus giving the well-known chequered pattern. The so-called shepherd's plaid of Scotland is known to have a very remote antiquity amongst the Eastern nations of the world. These plaids were in great favour in the Highlands of Scotland, where each clan wore a particular kind as its distinctive dress.

Tartar Emetic, or **Potassium Antimonyl Tartrate** ($C_4H_4O_6K(SbO) + \frac{1}{2}H_2O$), is prepared by boiling potassium hydrogen tartrate with antimonious oxide and water. It is readily soluble in water, and is used in dyeing as a mordant and in medicine as an emetic.

Tartaric Acid, or **Dihydroxysuccinic Acid** ($C_4H_4O_6$), is a commonly occurring vegetable acid, and is contained in grapes and other fruits. During the later stages of the fermentation of grape-juice, impure potassium hydrogen tartrate or argol is deposited. From this salt the commercial acid is prepared. The crude argol is partially purified by recrystallisation from hot water, and it is then boiled in solution with chalk. Calcium tartrate is deposited and the T. A. is set free from this by treating with dilute sulphuric acid. The acid forms large transparent crystals, is readily soluble in water and alcohol, but insoluble in ether (melting point 167° C.). Like other dicarboxylic acids, it forms both hydrogen and normal salts. The acid salt is known as 'cream of tartar' and the potassium sodium salt as 'Rochelle salt.' T. A. is used in the preparation of effervescent drinks and in baking-powders. There are four optical isomerides of the acid, viz. dextro-tartaric, levo-tartaric, meso-

tartaric (inactive), and racemic acid (inactive).

Tartars (properly Tatars), a term applied to mixed races inhabiting parts of Siberia, Turkestan, and the Steppes. They are, in fact, a Mongolo-Turki people, though the name was first given to certain tribes of the Tunguses. In the Middle Ages, however, it was made to include the warriors of Mongolian and Turkish origin who followed the redoubtable Genghiz Khan, whose exploits and deeds of savagery left so lively an impression on Europe. Indeed, it was probably about that time that their original name of 'Tatar' became altered to 'Tartar,' from a fancied connection with the Gk. word *tartaros*, hell. The fierceness of the T. is proverbial. In modern times the word is used to denote a variety of tribes, including the Kirghiz, a nomadic race inhabiting the Steppes, the Kalmucks, Kipchaks, and Crim Ts., the blending of the races, and the mingling, in varying degrees, of Mongolian and Caucasian characteristics being puzzling to ethnologists.

Tartarus, son of Æther and Ge, and by his mother Ge the father of the Gigantes, Typhceus and Echidna. In the *Iliad* T. is a place beneath the earth reserved for the rebel Titans, as far below Hades as Heaven is above the earth. Later poets use the name as synonymous with Hades.

Tartary, or Tatar, a term formerly given to Central Asia, on account of the inroads of Tartar hordes in the Middle Ages. It comprised the whole central belt of Central Asia and E. Europe, from the Sea of Japan to the Dnieper, including Manchuria, Mongolia, Chinese Turkestan, Independent Turkestan, the Kalmuck and Kirghiz steppes, and the old khanates of Kazan, Astrakhan, and the Crimea. Latterly the term had a more limited significance, and included only Chinese Turkestan and W. Turkestan. In 1920 a Tartar Autonomous Soviet Socialist Republic was formed in E. Central European Russia. It is watered by the Volga and its tributary the Kama, and its cap. is Kazan.

Tartini, Giuseppe (1692-1770), an Italian composer and violinist of the same tradition as Corelli and Vivaldi, b. at Pirano. In 1728 he started a violin school. His compositions for violin comprise over 100 sonatas and as many concertos, including the famous *Devil's Trill* sonata.

Tarudant, the cap. of the prov. of Sus, Morocco, about 125 m. S.W. of Morocco, and between the R. Sus and the Atlas Mts. It is an important caravan centre. The chief minerals are copper, gold, iron, and silver, while

copper goods are manufactured, and dyeing and tanning carried on. Pop. 8793.

Tar, Wood, see TAR.

Tashi Lama, or Teshu Lama, one of the two great lamas of Tibet. He is the head of the great monastery of Tashilhunso, and while he does not possess the secular authority of the Dalai Lama, he is equal to him, if not superior, spiritually. During the absence of the Dalai Lama after the British Expedition of 1904, he was the head of Lamaism in Tibet. See LAMAISM.



[By courtesy of the Tasmanian Government.]

ABEL J. TASMAN

Tashkend, or Tashkent, former cap. of the gov.-general of Russian Turkestan and of the ter. of Syr-Daria, is now a city of the Uzbek Soviet Socialist Republic. It is situated on a trib. of the Syr-Daria, 160 m. N. of Samarkand. The city is divided into two—the native and the Russian—and is well built and has many large public edifices. A university was established in 1919. The trade of the city is important, the chief manufs. being leather goods, metals, and textile fabrics. It is connected with the main Russian railways at Orenburg, and is served by air lines. Pop. (1926) 323,613.

Tashkurghan, the chief place in the dist. of Khulm, Afghan Turkestan, 4 m. S. of the ruined tn. of Khulm. It is an important trading centre. Pop. 50,000.

Tasichozong, a tn. in Bhutan, 13½ m. S.W. of Punakha. It has a large monastery with 300 priests.

Tasman, Abel Janszoon (c. 1602-59),

a Dutch navigator and explorer. The exact date of his birth is not known, but the date above given is surmised. He was commissioned by the governor-general of Batavia, Van Diemen, to discover the 'Great South Land.' Whilst on this exploit he was successful in discovering Tasmania, which he at first named Van Diemen's Land, 1642. An Eng. edition of his journal from 1642-44 was published in 1898.

Tasman Glacier, situated in the S. of the South Is. of New Zealand; it was discovered in 1862 by Julius von Haast. It has a total area of just over 20 sq. m., and lies practically at the base of the mountain heights of the Southern (New Zealand) Alps.

Tasmania. This island, which forms the seventh state of the Commonwealth of Australia, is separated from Victoria by the Bass Strait, which is about 140 m. wide. It lies between the parallels of 40° 40' and 43° 38' S. lat. and 144° 30' and 148° 30' E. long. A little smaller than Scotland, it is the smallest of all the Australian colonies as well as the most temperate and pleasant.—Captain Cook, indeed, recorded its climate as being 'the finest in the world,' and his verdict is not without confirmation. The N. coast forms a concave curve flanked by the island groups of Furneaux (E.) and the Hunter and King Is. (W.). The northern and westerly coasts are not greatly indented, but have some good harbours. The E. coast is much more indented, whilst the S. and S.E. coasts are formed of a series of curiously shaped peninsulas. Area, including dependent islands, 26,265 sq. m. Pop. (1931 est.), 219,700.

Physical Features.—It is conjectured that T. was once part of the mainland, the islands in the Strait being, it is supposed, part of a mountain range that connected the two lands. It may be described as a beautiful, well-watered island, rich in harbours and inlets, crossed by high mountain chains, full of crags, glens, and ravines of bold appearance, the basaltic cliffs of some being several hundred feet in height. On the coast there are good anchorages, and many excellent harbours. Altogether the coast offers the most manifold changes, and generally charming scenery, being for the most part of a bold and rocky character.

The principal islands belonging to T. are over fifty in number, the Furneaux group, at the east end of Bass Strait, and off the N.E. corner of T., including Flinders Island, with an area of 800 sq. m.; Cape Barren Island, 170 sq. m., and Clarke Island, 30 sq. m.; besides these are Chappell Island and Kent's Group, aggregating

about 40 sq. m. On these islands live a number of half-castes, or so-called half-castes—especially of late on Barren Island—descended from the offspring of sealers and native women. Strictly, however, they are of mixed and almost untraceable ancestry.

T. has two mountain chains, separated by the central dist., through which is the communication between the N. and S. of the island. That to the E., or the dividing range, has an average height of 3750 ft., and runs nearly N. and S., parallel with the E. coast. Among the peaks are Row Tor, or Mount Arthur, 3895 ft.; Mount Barrow, 4664 ft.; Mount Victoria, 3900 ft.; Ben Nevis, 3900 ft.; and Ben Lomond, 5160 ft. The western chain is an elevated table-land, averaging 3000 ft. in height, in the centre of the island, which contains all the large lakes and from which branch many ranges in all directions except eastward. From this tableland spring the peaks, Table Mountain, 3600 ft.; Barn Bluff, 5115 ft.; Mount Field West, 4700 ft.; Cradle Mountain, 5069 ft., and a number of others over 4000 ft. In the S. is Mount Wellington (4166 ft.), at the foot of which is Hobart.

The island is well watered, and abounds in rivers, rivulets, and creeks, many of them rising from the lakes of the table-land, the average fall to the sea being estimated at 93 ft. per m. The principal rivers are: the Derwent, about 130 m. long (on the estuary of which is Hobart), which issues from Lake St. Clair, receiving in its course the rivers Nive, Dee, and Jordan from the N., and the Florentine and Russell from the S.; the Huon, about 100 m. in length, issuing from Lake Edgar, along whose shores the great apple orchards of the state are situated, and which receives the Cracroft and Picton from the S., and the Weld and Russell from the N., and falls into D'Entrecasteaux Channel; the Coal River, rising in the eastern chain of mountains, and running S. into Pittwater. The mouths of these three rivers are to the S.E. of T. To the S.W. and W. are: the Davey River, the Spring, the Gordon, with tributaries the Wedge, Denison, Serpentine, and Franklin rivers, falling into Macquarie Harbour; King River, with its tributaries the Queen and Eden, also falling into Macquarie Harbour; the Pieman River, consisting of the rivers Mackintosh, Murchison, Huskisson, and Donaldson; and the Arthur River—these two last falling into the Southern Ocean. On the N., flowing into Bass Strait, are the Montagu,

the Duck, the Inglis, the Mersey, and the Tamar (the last-named being navigable up to Launceston by interstate steamers, or 40 m. from its mouth). The River Gordon and King River on the W. coast are of remarkable beauty, notable for their striking reflections. To the N.E. are the Piper, Little Forester, and Trent, rising in the western slopes of Mount Victoria and debouching into Ringarooma Bay. Flowing to the E. are the Anson, emptying into Anson Bay, the George, into George's Bay, Scamander, and Swan.

The W. coast of T. is bold, rocky, and inhospitable; but there are several

county of Somerset, about 20 sq. m.; Lake St. Clair; Arthur Lake, and Lake Echo. These lakes form the head-waters of the principal streams flowing S., W., and N.

In physical characteristics, the surface of T. is uneven, being a succession of hills and valleys of greater or less height and depth, and peaks and glens, and it presents a pleasing variety of scenery—snow-capped mountains, the glassy lakes, wild shores, green valleys, extensive sheep-lands, studded with neat homesteads, and rendered delightful by the subdivision into fields and highly-cultivated gardens and orchards.



[By courtesy of the Tasmanian Government.]

HYDRO-ELECTRIC PIPE-LINE AND POWER-STATION AT WADDAMANA, TASMANIA

accessible ports. The chief harbours are: on the W. coast, Port Davey (formerly much frequented by whaling vessels), Pieman River, and Macquarie Harbour; on the N. coast, Stanley, at Circular Head, Emu Bay, and Port Frederick, at the mouth of the Mersey; on the E. coast, George's Bay, Oyster Bay, Prosser Bay, Spring Bay, and Fortescue Bay. The S. and S.E. of the island is studded with safe bays and harbours, the principal being Port Arthur, Storm Bay, Norfolk Bay, Frederick Henry Bay, D'Entrecasteaux Channel, Port Esperance, and Southport.

There are numerous extensive fresh-water lakes on the elevated table-lands, the largest being the Great Lake, in the county of Westmoreland (3822 ft. above sea-level), covering an area of upwards of 40 sq. m.; Lake Sorell, in the

Climate and Rainfall.—In climate and rainfall, T. is suggestive of England, though warmer and sunnier. Hot winds are almost unknown, and the summer heat is tempered by sea breezes and mountain air. The average temperature of Hobart in the hottest month is 62.3 F. The winter is cold enough to produce thin ice in the lowlands and snow in the mountains and plateaus. The average temperature in the coldest month is 45.3 F. The mean temperature for the year is 54.3° F. The average rainfall of T. is about 29.6 in., but there is much variation in different dists.

Geology.—As regards the geological formation of T., the great mountain range that traverses nearly the whole of the central part of T. is of trap, or greenstone formation, and its upheaval has burst through the more

recent rocks of sandstone, clay-slate, and limestone that once overlaid it. The rocks on the E. and S.W. coasts are respectively granite and quartz, associated with vast quantities of micaceous rocks. In the N.E. portion of the island, granite and metamorphic rocks exist in large masses, and in still larger quantities all over the S.W. corner. Mount Wellington consists mainly of massive greenstone. Volcanic action in parts of the island is strongly marked, and igneous and volcanic rocks are prevalent.

Fauna.—The fauna in general is that of Australia, but there are several species peculiar to the island—the T. devil (*Sarcophilus ursinus*) and the tiger (or striped) wolf, which, on account of the damage it wrought to sheep, is now extinct. Among other larger indigenous animals are the native hyæna (*Thylacinus cynocephalus*), wombat (*Phascolomys ursinus*), platypus, and, among smaller, the bandicoot and native cat. The majority of these are nocturnal in their habits. Among reptiles are snakes—tiger, copperhead, and whip—lizards, and iguanas. Bird life is abundantly represented both in land and aquatic species; among the former are cockatoos, jays, whitehawks, eagles (*Aquila audax*), sparrowhawks, owls, moreporks, paroquets, diamond birds, blue wrens, firetails, and many others. Among those of the lakes and sea-coast are black swans, snipe, herons, bitterns, petrels, cormorants or shags, etc. The sheltered bays abound in fish—trumpeter, perch, rock-cod, flathead, whiting, colonial salmon. The principal fresh-water fish are the eel, blackfish and trout.

Production, Manufactures, etc.—The vegetation of T. is practically identical with that of Australia; the eucalyptus is the most predominant feature. Of the 17 million acs. comprised in the state, nearly one-half is unoccupied; over 6 million acs. are alienated, including over 12,000 agricultural holdings. The remaining 3 million acs. are leased or occupied for public purposes. The chief farm crops are wheat, oats, barley, hops, potatoes, peas, and beans, forest-trees, and apples. Cereals of all kinds and root crops thrive in most parts of the island, the soil of decomposed basalt situated in the N.W. and N.E. being especially fertile. Hops grow well in the S. and the T. fruits—particularly apples—are well known. Apple production has reached nearly 3 million bushels, valued at nearly £1,000,000. Potatoes and mixed farming are accountable for much of the prosperity of the state. Wool production has reached an annual value of over £1,000,000; butter production aggre-

gates 6 million lb., and cheese about 1 million lb. The chief minerals are tin, copper (blister), silver, lead, and gold. The chief mining dist. is the W. coast, and the annual output is worth about £1,500,000. Forestry is a great feature of T., the country being naturally forest-clad. The chief timber is the hardwood variety (eucalyptus), and the chief export timbers are the stringy-bark and blackwood, the former being used for bridges, railway sleepers, etc., and the latter for furniture and cabinet work. Other woods are huon, celery-top, and King William—all species of pine. Industries include woollen mills, jam and fruit-preserving factories, butter and cheese factories, tanneries, bricks and pottery, saw-mills, joinery and furniture, engineering, railway works, flour mills, boot and shoe factories, printing. It has recently been decided to establish a paper-pulp factory at Geevestown. There are also electrolytic zinc works. Cheap electric power is a strong factor in the prosperous industrial history of the state. The chief tns. and centres are linked up with the railway system, which comprises 800 m. of track (658 being state owned). Chief tns.: Hobart (cap.) city (pop. 45,050; with suburbs, 57,800), Launceston and suburbs (29,000), Burnie (3650), Devonport (4400), Deloraine, Latrobe, Lilydale, Scottsdale, Oatlands, Ross, New Norfolk, Geevestown, Sorell.

History and Government.—T. was originally called Van Diemen's Land and was discovered by Tasman in 1642. In 1777 it was visited by Cook, who thought it formed part of the mainland. It was proved an island by circumnavigation by Bass and Flinders in 1798. Other notable explorers who visited the island were Du Fresne (1772), Furneaux (1775), D'Entrecasteaux (1792-93), and Hayes (1794). The earliest settlement was established under Lieut. Bowen at Risdon, on the R. Derwent, by Governor King of N. S. Wales, in 1803. In 1804 another expedition reached Port Dalrymple (Tamac R.) and formed a settlement at George Town. In 1825 the island, which had previously formed part of N. S. Wales, was proclaimed a separate colony; and in 1856 the name of Van Diemen's Land was changed to T. and responsible gov. granted. In 1901 T. united with the colonies of the mainland in establishing the Commonwealth of Australia. Parliament consists of two chambers, the House of Assembly (30 members) elected by adult suffrage, and the Legislative Council (18 members), with limited adult suffrage. The King is directly represented by the Governor, who

presides over the Executive Council. T. elects five members of the Commonwealth Lower House and six of the Upper House.

Aborigines.—These numbered in 1803 about 5000, but they are now wholly extinct. The British treatment of them was cruel, the principal offenders being bush-rangers and the lower type of convict stockmen; and for the first thirty years after the settlement a constant war was waged between native and settler. Finally, about 1840, some attempts were made to preserve them on reservations on Flinders Island in Bass Strait. But their mortality rate was so high that by 1847, when they were removed to Oyster Bay, near Hobart, fewer than fifty remained. William Lanne, the last full-blood male, *d.* in Hobart Hospital in 1869.

Consult Bonwick, The Last of the Tasmanians (London), 1870; Fenton, *History of Tasmania* (Launceston), 1884; Just, *Official Handbook of Tasmania* (London), 1892; *The Illustrated Australian Encyclopedia* (edited by A. W. Jose and H. J. Carter), 1926; *Tasmania: its People and Possibilities*, issued by the State Development Board, 1929.

Tasmanian Devil (*Sarcophilus ursinus*), a marsupial which occurs only in Tasmania. It bears an external resemblance to a small bear with a long tail, and is brownish-black in colour with a broad white band across the chest. It is very fierce and blood-thirsty and often destroys poultry and even sheep.

Tasman Sea, the name given by the British Admiralty to the Pacific waters which lie between New Zealand and Australia and Tasmania.

Tassie, James (1735–99), a gem-engraver and modeller, *b.* at Pollokshaws near Glasgow. He met Quin at Dublin and with him invented the 'white enamel composition' which he used for his medallion portraits and reproduction of gems. The 'Descriptive Catalogue' (1791) of Rudolph Eric Raspe enumerates 16,000 pieces from his hands, but before his death this had reached 20,000. His nephew, *William Tassie* (1777–1860), was also an engraver and modeller, and won the lottery for Boydell's Shakespeare Gallery in 1805.

Tasso, Bernardo (1493–1569), *b.* at Venice. A poet of high contemporary standing, now remembered as the father of Torquato T. (*q.v.*). Technically skilful, his poetry was marred by exaggeration and bombast, imitating Petrarch and Ariosto. Educated at Padua, he became secretary to Prince Sanseverino of Salerno. His works, mostly published posthu-

mously, include *Amadij* (1560), *Floridante* (1587), *Lyrics* (1749). Life by G. Camperi.

Tasso, Torquato (1544–95), one of the finest and most widely influential Italian poets, son of Bernardo T. (*q.v.*), *b.* at Sorrento. In 1560 he was sent to Padua to study law, but, influenced by the literary environments of his early years at Rome and Venice, he devoted himself to literature and philosophy. Two years later he produced *Rinaldo*, a romantic poem dedicated to Cardinal Luigi d'Este, who later became his patron (1565). From 1578 to 1586 T. was imprisoned in a madhouse, probably on account of his extreme eccentricity and religious mania. Meanwhile, *La Gerusalemme Liberata* had been completed (1575) and submitted to several critics. On his release T. went to Mantua as the protégé of Prince Vincenzo Gonzaga, and here he rewrote his great epic in accordance with his critics' suggestions. The result, *La Gerusalemme Conquistata* (1592), was a pedantic effusion, in which he expurgated the fine passages of paganism and chivalry of the original edition on which his fame ultimately rested, *e.g.* those relating to the characters Erminia, Clorinda, and Armida. The last few years of his life were passed between Naples and Rome. In 1594 he was summoned by the pope to be crowned poet laureate, but he *d.* on his arrival in Rome at the convent of Sant' Onofrio, without receiving the honour. T.'s poetry was an attempt to reconcile classic form (*e.g.* the Virgilian epic in *Rinaldo*) with a deeper note of personal sentiment. Besides *La Gerusalemme*, his works include a pastoral drama, *Aminta*, a tragedy, *Torrismondo*, a comedy, *Gli Intrichi d'Amore*, and other plays and poems. *Works*, ed. Rosina, 33 vols. (Pisa); *Lives* by Milman (1850) and Hasell (1882).

Tassoni, Alessandro (1565–1635), an Italian poet, *b.* at Modena. He was employed in several diplomatic missions when secretary to Cardinal Ascanio Colonna (1599–1608), and later in the service of the Duke of Savoy. *La Secchia Rapita* (or 'The Rape of the Bucket'), a burlesque epic; *Pensieri Diversi*; and *Considerazioni sopra il Petrarca*, are his principal works.

Taste, in physiology, the sensation caused by the application of certain substances in solution to organs situated on the tongue, and to a lesser degree on the soft palate, the uvula, and adjacent structures. The terminal organs of T. are small oval bodies known as taste-bulbs, less than $\frac{1}{300}$ in. in length, and distributed un-

equally, but in enormous quantities, over the surfaces susceptible to the sensation. Substances which excite the sensation of T. must be in solution. The process is probably dependent on chemical changes taking place inside the taste-bulb, and evidence is forthcoming which tends to prove that each taste-bulb is only capable of communicating one variety of sensation. Four Ts. are usually identified—sweet, bitter, acid, and saline. All the other delicately differentiated sensations usually referred to the sense of T. are really small sensations.

Tatar-Pazarjik, or Pazardjik, a tn. of Eastern Rumelia, Bulgaria, 23 m. W. of Philippopolis, on the Maritza. Pop. (1926) 21,578.

Tata, Yamsetji Nasarwanji (1839–1904), a Parsee merchant and philanthropist, b. at Nosari in Baroda. He formed a company to work the iron ores of the Central Provinces on modern principles, and effected the lowering of the freights on Indian goods to China and Japan. He also introduced a silk industry after Japanese methods into Mysore, and endowed a research institute at Bangalore.

Tatar Republic, formed on May 27, 1920, as an autonomous republic of the Russian Socialist Federal Soviet Republic. It is bounded on the N. by Marish, Vyatka, and Votyak, on the E. by Perm and Bashir, on the S. by Samara and Ulianev, and on the W. by Chivash. The River Volga runs through it from N. to S., and its tributary, the Kama, from E. to W., joining the Volga at Spask. The cap. is Kazan, on the Volga. Pop. 179,200. Kazan lies due E. of Moscow, and is on the Trans-Siberian Railway. The university at Kazan, one of those founded previous to the Revolution, is now administered by the People's Commissariat for Education. The T. R. is governed by its own Central Executive Committee and Council of People's Commissaries. Private property in land is abolished, and the gov. owns all factories, mines, and waters of national importance; all forests and live stock and buildings are national property. In 1929 atheism became the state dogma, and the issue of all religious propaganda is forbidden, the rights of the churches being very much restricted. Much of the T. R. is covered with forests of oak, pine, fir, and other trees, and timber has become an important industry. Walking-sticks are manufactured in some parts, mainly for sale to travellers on the Volga. There are also extensive pastures which support sheep, from whose wool good cloth is manufactured.

There are large iron-works in Kazan, and cotton materials are made. Candles and soap are manufactured, and the T. R. is the source of the famous Russian leather. Area 24,600 sq. m. Pop. 2,900,400. In the fifteenth century a Tatar Kingdom was formed, with Kazan as its cap.; later Ivan III. made it a vice-regency. In the middle of the sixteenth century Ivan the Terrible incorporated Kazan with his own dominions, and the province of Kazan was formed in 1708.

Tate, Sir Henry, Bart. (1819–99), founder of the National Gallery, Millbank, better known as 'The Tate Gallery,' b. at Chorley in Lancashire. He was a sugar merchant, but spent all his leisure in devotion to the fine arts, and made a collection of pictures which he afterwards gave to the nation.

Tate, Nahum (1652–1715), an Irish poet, b. in Dublin. He issued several volumes of poems, and was the author of some indifferent plays. His poem, *Panacea*, a *Poem on Tea*, is perhaps his best effort. In 1692 he became poet laureate, and ten years later the office of historiographer-royal was bestowed upon him.

Tatian, the first Christian apologist, flourished in the latter part of the second century. He was a Syrian from the region of Mesopotamia, and a sophist who taught rhetoric with much success. Coming to Rome, he was converted to Christianity and became a disciple of Justin Martyr. He is famous as the author of *An Apology to the Heathen*, in which he defends the Christian faith and practice. He also wrote two lost works, *A Harmony of the Gospels* and *Perfection after the Pattern of the Saviour*.

Tati Concession, a gold-mining dist. of the British Bechuanaland Protectorate, with an area of 2500 sq. m., which was originally conceded by Lobengula in 1887. Chief tn., Francistown.

Tatius, Achilles, an Alexandrian writer of romances, probably lived in the fifth century A.D. His *Leucippe and Cleitophon* is written in elegant Gk., but the characterisation is weak. It is printed in the *Erotici Scriptores Græci*, and there is an Eng. translation by the Rev. R. Smith, 1855.

Tatler, see ADDISON, JOSEPH; STEELE, RICHARD.

Tatra-Füred, or Alt-Schmecks, a watering-place in the co. of Szepes, Hungary, 125 m. N.N.E. of Budapest.

Tatra Mountains, see CARPATHIANS.

Tatta, a tn. of Sindh, India, on the Indus, 54 m. E.S.E. of Karachi, once a tn. of importance. Pop. 10,000.

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Tattersall's, the name given to the establishment for the auction of horses, at present at Knightsbridge Green, London, Eng., whence it was transferred from Hyde Park Corner in 1865. It was founded by Richard Tattersall.

Tattooing, the name usually given to the custom common among many uncivilised tribes of marking the skin by punctures or incisions, and introducing into them coloured fluids, so as to produce an indelible stain. T. has been found in most of the islands of the Pacific Ocean, and among many of the aboriginal tribes of Africa and America, as well as, on a limited scale, in the East. The native chiefs of New Zealand tattoo the face and the whole body in a variety of very elaborate symmetrical figures. It is done by puncturing the skin with sharp-pointed instruments till the blood flows, and then rubbing in charcoal. The marks which result are permanent, and appear black on a brown skin, while on the skin of a European they appear blue. The age for tattooing the males varies from eight or ten years up to about twenty; the females have only the face slightly tattooed. The Bedouin Arabs, the Tanguses, and other eastern tribes, and many tribes of American Indians, still practise it. It prevailed amongst the anct. Thracians, and was distinctive of high rank. The anct. Britons also practised it, and traces of it lingered in England until after the Norman Conquest. Perhaps the practice of sailors and soldiers to print anchors and other marks on their arms is a relic of it still subsisting. *See also* MAORIS.

Taubate, a tn. in the state of São Paulo, Brazil, 78 m. E.N.E. of São Paulo. Pop. 6000.

Taucha, a tn. in Saxony, 5½ m. E.N.E. of Leipzig. Pop. 6575.

Tauchnitz, Karl Christoph Traugott (1761-1836), b. near Grimma, Saxony; established a printing business in Leipzig in 1796 and a publishing house in 1798. His special publications were stereotyped editions of the Gk. and Rom. classics, but he also printed Bibles and dictionaries. His son, *Karl Christian Philipp Tauchnitz* (1798-1884), carried on the business, and left money for philanthropic purposes. His nephew, *Christian Bernhard, Freiherr von Tauchnitz* (1816-95), also founded in 1837 a printing and publishing house in Leipzig, and began his Library of British and American authors in 1841. This Library now (1932) numbers over 5000 volumes. In 1868 he began the collection of Ger. authors, and in 1886 the Student's Tauchnitz editions appeared. He was

ennobled in 1860, and made a Saxon life-peer in 1877. He was British consul-general for the kingdom and duchies of Saxony (1866-95).

Tauler, Johann (1290-1361), a Ger. mystic, b. in Strassburg. His *Sermons*, marked by sincere practical piety, were printed at Leipzig in 1498; modern edition by Julius Hamberger, 1864. R. H. Hutton published T.'s sermons for festivals under the title of *The Inner Way*.

Taunton: (1) A municipal and parl. bor., market, county, and assize tn. of Somerset, England, 30 m. N.E. of Exeter. It has a magnificent fifteenth-century church, a hospital, which was originally a leper house, of the twelfth to thirteenth century, and the remains of a Norman castle which was built on the site of an old Saxon fort. The grammar school dates its foundation back to the sixteenth century. The chief products of the tn. are apples, cider, gloves, collars, and agricultural implements. Historically the tn. has played an important part in many ways. It was occupied by the pretender Perkin Warbeck in 1497. During the Civil War it was held for Parliament, and later in the same century it witnessed the proclamation of the Protestant 'King' Monmouth and the brutalities of Jeffreys and Kirke's 'lambs.' It returns one member to parliament. Pop. (1931) 25,177. (2) A city of Massachusetts, in Bristol co., of which it is the co. seat. It manufactures cotton goods, machinery, jewellery, stoves, and silver articles. It is about 30 m. from Boston. Pop. (1930) 37,355.

Taunus Mountains, a range of mountains which stretches well over 50 m. in a north-easterly direction from the confluence of the Rhine and the Main. It is extremely well wooded and the lower slopes are particularly fertile. The vineyards which are situated there are of world-wide reputation and produce such famous wines as Rudesheimer and Hochheimer. The chief mountain heights are Grosser Feldberg (2890 ft.) and Kleiner Feldberg (2715 ft.). On this range of mountains are situated some famous Ger. spas, such as Homburg, Wiesbaden, and Ems, all of which are noted for their mineral springs. A national monument representing the figure Germania was here erected in commemoration of the war of 1870-71.

Taupo, a lake of North Is., New Zealand, situated in the centre of the island. The chief river flowing into it is the Waikato, while near its shores are volcanoes.

Tauranga, a tn. and harbour of

North Is., New Zealand, on the Bay of Plenty. Pop. (1930) 2790.

Taurica Chersonesus, or **Tauric Chersonese**, also called the **Tauric Peninsula**, was an anct. name for the Crimea (*q.v.*).

Taurida, a former gov. of Russia, having for its boundaries the Black Sea and the Sea of Azov. It included the peninsula of the Crimea. It is now included partly in the Ukrainian S.S.R., partly in the Crimean Aut. S.S.R.

Taurine ($C_2H_7NSO_3$), amidoethyl-sulphonic acid, a crystalline substance produced in the decomposition of bile.

Tauromenium, see **TAORMINA**.

Taurus, a range of mountains in the S. of Asia Minor extending from the R. Euphrates to the Aegean Sea. Portions of the range are known by different names, as Ala-Dagh, Bulgar-Dagh—the height ranging from 8000 to over 10,000 ft.

Taurus, or the **Bull** (symbol σ), the second sign of the zodiac, which used to be the first of the year. It contains the beautiful star Aldebaran, and the groups Hyades and Pleiades, the last named being involved in nebulae. Other nebulae are the 'Crab,' discovered in 1731, and N.G.O. 1554 and 1555, both variable. ζ -Tauri is a spectroscopic binary, period 138 days, the spectrum showing helium; R. and S. are Mira variables; λ has a dark companion, the period of eclipse being 3.9 days. Boss has studied a globular cluster, 140 light years distant, and shown their common motion (see STARS, diagram).

Taus, or **Domazlice**, a manufacturing tn. of Czechoslovakia. Pop. 7700.

Tautog, or **Black Fish** (*Tautoga onitis*), a food fish which occurs off the Atlantic coast of N. America. It averages from 12 to 14 lb. and is much valued in American fish markets.

Tautomerism, or **Dynamic Isomerism**, in chemistry, the phenomenon exhibited by a substance that appears to have two different constitutions. Thus ethyl acetoacetate in some of its reactions appears to have the constitution $CH_3CO\cdot CH_2COOC_2H_5$, while in others its behaviour corresponds to the formula $CH_3C(OH)CH_2COOC_2H_5$. It has been shown that substances exhibiting T. are usually equilibrium mixtures of the two tautomeric forms. Both forms of ethyl acetoacetate have been isolated by Knorr.

Tavastehus, the cap. of the dept. of Häme, Finland, 60 m. N.N.W. of Helsingfors. Its castle, dating from the Middle Ages, is used as a prison. Pop. 6500.

Tavern, see **LICENCES AND LICENSING LAW**.

Tavernier, Jean Baptiste, Baron D'Aubonne (1605-89), a famous Fr. traveller of the seventeenth century, b. in Paris of Protestant parents, and commenced his career as a traveller in 1631, when he went to Turkey and Persia. During the succeeding years he travelled much in the East, visiting many places in Persia, Syria, and India. Finally he travelled through Batavia, and returned *via* the Cape. He published his famous *Six Voyages* in 1676, and a book dealing with his life and adventures was published in 1886 by Foret.

Taveta, a dist. of British E. Africa, near to Mount Kilima-Njaro, possessing an extremely rich vegetation.

Tavira, a seaport tn. of Algarve, Portugal, 20 m. N.E. of Faro. It trades chiefly in mineral waters, fruit, and wines, and is also engaged in fishing. Pop. 11,043.

Tavistock, a tn. of Devonshire, England, 15 m. N. of Plymouth, on the R. Tavy. It has fine buildings, chief amongst which are the parish church and the guildhall. There are also the remains of an abbey which was granted to the Russell family at the time of the Dissolution by Henry VIII. Part of this abbey now constitutes a public library. Industries are copper-mining and the extraction of arsenic. Pop. (1931) 4453.

Tavoy, a seaport, the cap. of T. dist., Tenasserim, Lower Burma, 30 m. from the mouth of the Tavy R. It is in a rice-producing region. Pop. 25,100.

Taw, a river of Devonshire, England, rising on Dartmoor, and flowing into Bideford Bay. Length 50 m.

Taxation is the term applied to the method of raising the revenue required for public service.

General Principles of Taxation.—The majority of economists of the last century set out by an enumeration of the four classic canons or maxims of Adam Smith. They are, briefly stated, as follows: (1) The subjects of a state ought to contribute towards the support of the gov. as nearly as possible in proportion to their respective abilities. (2) Taxes should be certain, not arbitrary. (3) Taxes should be levied at the time at which it is most convenient for the contributor to pay them. (4) A tax ought to be so contributed as both to take out and keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the state. It is obvious that no gov. with any regard to the cost of collection could possibly undertake to

secure such an equality for each *individual* as distinct from each *class* of individuals, and the most that can be done is to take classes in the aggregate, determine what kind of tax presses least hardly on the different classes, and, in the case of imposts laid on all, to lessen the burden by graduation, abatement, proportionate percentage, or some other means of equitable adjustment. In spite of Mill's criticisms, embodying the opinion that a tax in the shape of a given fraction of a small income is a heavier burden than the same fraction deducted from a much larger income, Mr. Gladstone adopted the principle of abatement, and in renewing the income tax in 1860 exempted all incomes below £100 and taxed higher incomes on the excess above £60. (Bentham first advanced the principle of leaving untouched a certain minimum of income sufficient to provide the necessities of life.) (For the present system of exemption and graduation, the differentiation of rates in the case of unearned income, and the imposition of surtax, see under INCOME TAX.) Mill allowed that some taxes which violated the maxim of equality might none the less be justifiably imposed.

The second of Smith's maxims is in effect violated by the imposition of *ad valorem* duties on certain imported commodities instead of duties of a fixed money value (Fawcett, *Political Economy*). Fixed duties, too, are more in keeping with free-trade principles, especially as those imposed on commodities the quantity and price of which vary according to climatic or other conditions must necessarily tend to discourage production. Adam Smith's third maxim is commonly assumed to be observed in the ordinary course of commercial dealing thus: The wholesale merchant pays the duty in the first place if the commodity be a dutiable import, or the retailer pays for foreign goods by means of negotiable instruments to cover both the wholesale price and the duty, the amount of the tax being ultimately borne by the consumer. Many economists confidently assert that taxes on rent and taxes on real profits cannot be transferred. No doubt the occupier of land can, if he pays the property tax, deduct it from his rent, but it is a moot point whether land taxes (whatever may be their immediate operation) in almost any shape or form do not, in a country where land is limited, result in increased rentals. Taxes on raw material transgress Adam Smith's fourth rule, for they add to the cost of production in the first stage of the

industrial process, and by increasing the capital needed for supplying the commodity in question, accumulate a charge on the consumer. Whence the utility of bonding houses, wherein goods may remain until actually sold, and the payment of duty postponed till that time, the result being that the consumer avoids payment of the interest on the duty as well as on the original cost of the goods. The T. of raw material has, ever since the repeal of the Corn Laws, met with the almost unanimous reprobation of economists, even those of the protectionist school. But it has hitherto required all the ingenuity of the Conservative Press and the strenuous assertions of the pamphleteer to assure the electorate that the protagonists of Tariff Reform (*q.v.*) have no intention (if that be so) of taxing raw material (including in that term food required for the maintenance of productive labour). Finally, in connection with Adam Smith's fourth rule it is to be added that the cost of collecting taxes should be as low as possible, as a corollary of which it follows that the articles chosen for taxation should be such that the cost of collection is not out of all proportion to the revenue yielded by the tax.

Direct and Indirect Taxation.—Adopting the orthodox point of view, a tax is said to be *direct* when it is imposed on the incomes or property of individuals; *indirect* when it is imposed on the articles on which such incomes or property are expended. Mill expresses the distinction as follows: 'A direct tax is one which is demanded from the very persons who it is intended or desired should pay it. Indirect are those which are demanded from one person in the expectation and intention that he shall indemnify himself at the expense of another, such as excise or customs.' It is difficult to say who really bears the burden of a tax on rent, though all such taxes are commonly assumed to fall upon the landlord. (See also under PUBLIC REVENUE.) The current division into direct and indirect taxes, for what it is worth, places in the first category taxes on rents, profits, and wages; certain stamp duties, such as those on insurance, bills, notes, and drafts (all of which are taxes on income generally); stamps on deeds, on probates of wills, on legacies and successions, together with all *assessed taxes*, such as carriage licence duties and dog tax (all of which are taxes derived from property). Excise and customs duties are the only taxes commonly included in the second category. Poor rate, in so far as levied on land, is borne by the land-

owners; in so far as levied on trade premises, it is borne by the consumers of the articles manufactured on such premises. Each system of T. has had powerful advocates. A large revenue is easily collected under a system of indirect T., and, when the tax hits only a few commodities, all of which are widely consumed, the machinery of collection is simple and inexpensive; again, an indirect tax takes as little as possible out of the pockets of the people over and above what it yields in the shape of public revenue. Conversely, direct taxes on articles of luxury involve expense in collection. But, on the other hand, direct taxes, especially if limited to profits on capital and upon *all* kinds of capital, are perfectly just. The Great War brought about huge increases in the taxation imposed in the belligerent countries. Borrowing was indulged in to an extent hitherto undreamed of, and colossal national debts were piled up, in Europe that of Great Britain reaching the peak figure in 1920 at £7,878,607,166. The British Gov. was not slow in getting to work in raising extra revenue, and in the autumn of 1914 the unusual method of passing a second Budget was adopted. The income tax and super-tax were doubled for the remainder of the financial year. This had the effect of raising the income-tax for 1914-15 to an average rate of 1s. 8d., and the rate of 2s. 6d. became operative in 1915-16. With the progress of the War, a nearer estimate of its cost became possible, and for the second year (1915-16) in succession a second Budget was passed. The duty on sugar was raised from 1s. 10d. to 9s. 4d. a cwt. and the tobacco duty was increased by 50 per cent. Duties, protectionist in character, were introduced. These became known as the M'Kenna duties (from Mr. Reginald M'Kenna, Chancellor of the Exchequer), and imposed a 33½ per cent. ad valorem duty on motor cars, cycles, musical instruments, clocks, watches, and cinema films. Mr. M'Kenna also raised the income tax to 3s. in the £ and super-tax was increased. The exemption limit was reduced from £160 to £130, and abatements on incomes up to £600 were curtailed. Perhaps the greatest innovation by this Budget (1915) was the introduction of the duty known as excess profits duty. As implied in its name, this imposed a duty on the excess of the profits of any business, as assessed for income tax, over its profits in a pre-War year. The taxpayer could make a choice of any of the years from 1911 to 1913, and having made a choice, future profits were calculated accordingly. The actual duty was 50 per

cent., increased in 1916 to 60 per cent. and in 1917 to 80 per cent. This was not a good tax, offending, as it did, nearly all the accepted principles of taxation. Its best excuse is that in most difficult times it raised during the six years of its existence nearly £1200 millions. The remaining three War Budgets show nothing novel in the way of taxation. There were, of course, heavy increases. Sugar and tobacco were taxed to the tune of 2½d. and 8s. 2d. a lb. respectively. A match tax and an entertainment tax were also introduced. The actual increase in revenue raised from taxation during the War may be seen from the following table, in which the second column shows millions of pounds:—

1913-14	163
1914-15	189
1915-16	291
1916-17	514
1917-18	613
1918-19	784

The post-War period unfolds no innovations in taxation. The income-tax rate has been altered from time to time, the following table giving the standard rates:—

1918-19 to 1921-22	6s.
1922-23	5s.
1923-24 and 1924-25	4s. 6d.
1925-26 to 1929-30	4s.

The financial crisis which developed in Britain in the autumn of 1931 resulted in the resignation of Mr. Ramsay MacDonald's second Labour Gov. and the formation of a National Gov., which enabled Mr. Snowden to introduce his second Budget for the year, imposing the necessary taxation to balance the national finances. Having done its work, this National Gov. resigned, and the General Election of Oct. 1931 returned a second National Government with Mr. Ramsay MacDonald as premier. One of its first tasks was the passing of the Abnormal Importations Act, which levied certain duties on articles imported from abroad, thus making a serious departure from the free-trade principles which had marked British fiscal policy for so many years. The Bill was introduced by Mr. Walter Runciman, President of the Board of Trade, who stated that it was an endeavour to adjust the serious adverse trade balance of Great Britain. See G. Armitage-Smith, *Principles and Methods of Taxation*.

Taxation in the U.S.A.—In addition to the Federal taxes, levied by the Gov. of the U.S.A. mainly on in-

comes, every one of the forty-eight states has its own taxation laws whereby revenue is raised for maintenance of the state, county and city governments. Thus in most states a citizen of any means at all pays four taxes—Federal, state, county and city. The state legislatures usually lay down the main lines along which the counties and cities may tax their citizens. Some states, like New York, levy a tax on incomes, just as does the Federal Gov. But the usual rule in most of the states is that the tax is laid on property. This takes two forms—a tax on tangible property and a tax on intangible property. Tangible property means mainly real estate and stocks of goods. Intangible property means money, bonds, and stocks. In most states there is a state assessor, who assesses the value of the property to be taxed. In each county there is a county assessor, who does the same thing for the property subject to county taxes, and in each city there is a city assessor who does the same thing for property subject to municipal taxation. Great scale maps are maintained, showing the real estate for each section, carrying the names of the owners, data as to the value of the real estate and figures showing what was the valuation in preceding years. School, hospital and church property is usually exempt from all taxation. In addition, there are often licence taxes on people in business and on professional men like doctors and lawyers.

Taxation of Costs, see COSTS.

Taxation of Land Values, see LAND TAXES.

Taxidermy, the art of preparing the skins of vertebrate animals so as to give them the appearance of life and preserve their characteristics as nearly as possible. The art began to be practised in the sixteenth century, and the Sloane collection, which formed the nucleus of the natural history collection at South Kensington, was made in the early eighteenth century. Skinning must be done with great care, as if the skin is flayed off there is great difficulty in restoring its proper proportions. A bird is opened under the wing. If opened on the breast, the bowels may be cut into, and a white breast spoiled. After the body is removed measurements are taken. While the skin is inside-out it is painted with a preservative soap; Mr. Montagu Browne recommends the following: Whiting or chalk, 1½ lb.; white Windsor soap, ½ lb.; chloride of lime, ½ oz.; and tincture of musk, or eucalyptus oil, ½ oz. In making a skin, the head is filled with tow before being turned through the

neck, and with this material a false body is then constructed by wrapping the tow round a piece of wire. This is put into the skin, and while drying any irregularity is corrected. 'Setting up' may be done by wiring and filling in with cotton-wool or tow. This is known as the 'soft-body' method. The 'hard-body' method is that of using a carved-out body of cork. A more modern method is to retain the skeleton, and after freeing it from flesh and washing it with carbolic acid, to work over it with tow or clay to produce a shape like that of the body. Another method, with larger birds and most mammals, is to prepare a mould of plaster by arranging the hardened carcase in a suitable attitude. When the mould is dry paper casts are made by pressing a series of layers of paper into the mould, so that when the model is properly mounted and prepared the skin can be drawn over it. After setting up, the specimen is painted over with a solution of 50 grains of bichloride of mercury in a pint of methylated spirit of wine, as a protection against the ravages of insects. With the exception of grasses, mosses, and dried leaves, real natural objects should be excluded from the 'mounting,' as they are almost certain to harbour insects. The highest art of the taxidermist fails with fishes, for shrinking and shrivelling of the skin cannot be avoided. A more satisfactory method is to take a cast as soon as possible after capture, and make an exact model in plaster. See Montagu Browne, *Practical Taxidermy*.

Taximeter, an instrument for use in a hired vehicle, as a motor cab, for automatically showing the fare due. The name 'taxi' for a motor cab is derived from this apparatus. The T. records the fare by a combination of time and distance. It is worked by one of the front wheels of the cab, and comprises, in its essentials, a clock-winder, a gear-box and, attached to the latter, a meter which registers the time and distance. By a simple adjustment of the tariff disc handle the apparatus may be made to record time only. The meter is set in operation by simply turning down the disc handle and at the same time pushing down a flag, the position of which indicates whether the T. is recording or at rest.

Taxing Master, see COSTS.

Taxodium, a genus of deciduous coniferous trees. *T. distichum*, the deciduous cypress, is a tall tree often grown in Britain, bearing cones about the size of a walnut; the trunk is usually very thick and the base is often swollen, while knees or hollow

protuberances rise from the roots when the tree grows in swampy soil. The timber is of considerable value. Other species include *T. heterophyllum*, the Chinese water pine, and *T. mucronatum*.

Taxus, see Yew.

Tay, a riv. and firth of Scotland. It rises on the borders of Argyllshire in the Grampians, and flows first of all in a N.E. direction and then at the confluence of the Tufamel in a S.E. direction. It flows through Perthshire and its estuary forms the division between the counties of Forfar and Fife. Its chief tributaries are the Tummel, the Bran, the Almond, and the Earn. The Earn joins it at its estuary. The total length of the river, including the firth, is 115 m. It is crossed at Dundee by the famous T. Bridge. The chief port is Dundee, but shoals prevent navigation to this port being very good. The river, however, is navigable as far as the town of Perth. The total area of the T. basin is nearly 2500 sq. m. It is famous as a salmon river, the annual value of the salmon caught being about £50,000.

Tay, Loch, one of the lochs which are found in the course of the R. Tay. It is situated in Perthshire, not very far from the source of the river and before the river joins the Tummel. Other lochs in the course of the same river are lochs Dochart, Lydoch, and Rannoch.

Tayabas: A prov. of Luzon Is., Philippines, forming an isthmus between the two parts of the island. Grain and copra are the chief products. Cap. Lucena. Pop. 150,000.

Taylor: (1) A bor. of Lackawanna co., Pennsylvania, U.S.A., 3½ m. S.W. of Scranton, engaged in the manufacture of silk and in coal-mining. Pop. (1930) 10,428. (2) A city of Williamson co., Texas, U.S.A., 35 m. N.E. of Austin. Chief products are cotton and dairy produce. Pop. (1930) 7463.

Taylor, Bayard (1825-78), an American author, b. in Pennsylvania. He was apprenticed to a printer, but in 1844 set sail for Liverpool and spent the next two years in travel, the result of which appeared in his *Views Afoot, or Europe seen with Knapsack and Staff*, 1846. He went to Mexico, and published a book of travels entitled *El Dorado, or Adventures in the Path of Empire*, 1850. He next visited Egypt, Asia Minor, India, Hong-kong, China, and Japan, and recorded his journeys in *A Journey to Central Africa and Land of the Saracen*, 1854; and *A Visit to India, China, and Japan*, 1855. His narrative poem, *Lars*, and *Northern Travel* appeared as a result

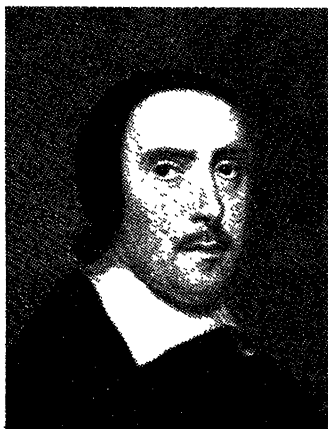
of a visit to Sweden, Denmark, and Lapland, but his reputation as a poet rests upon his translation of Goethe's *Faust*, one of the finest attempts of its kind. Taylor also wrote novels, e.g. *Hannah Thurston*, 1863, and critical essays, notably *Studies in German Literature*, 1879.

Taylor, Brook (1685-1731), an Eng. mathematician, b. at Edmonton, Middlesex. T. entered St. John's College, Cambridge, in 1701, and took degree of LL.B. in 1709. He became a fellow of the Royal Society in 1712, and its secretary in 1714, and the same year took his degree of LL.D. In 1716 he went to Paris, and had an enthusiastic reception from the Fr. savants. He returned to England in 1717, and resumed his study, but was forced by declining health to resign his secretaryship in 1718. T. contributed able papers on higher algebra, dynamics, and general physics. His *Methodus Incrementorum* was published in 1715, and a *Treatise on Linear Perspective* in 1719.

Taylor, Sir Henry (1800-86), an Eng. dramatist. He was a contributor to the *Quarterly Review* when he was twenty. In 1824 he, through the influence of Mr. Henry Holland, was appointed to the Colonial Office. He devoted his leisure to writing, and in 1828 produced a tragedy, *Isaac Commenus*, which was a failure. This was followed by *Philip van Artevelde* (1834), which was a great success. In recognition of his official labours, T. was in 1869 created K.C.M.G. His *Autobiography*, privately printed in 1877, was published in 1885.

Taylor, Jeremy (1613-1667), an Eng. divine, was educated at Cambridge University, and took holy orders in 1634. Shortly afterwards, deputising for his friend Riden, divinity lecturer at St. Paul's, his sermons attracted the attention of Laud, who interested himself in the young man, and sent him to Oxford, where he was elected to a fellowship at All Souls in 1636. He became chaplain to Laud and shortly after was appointed one of the King's chaplains. There were rumours that he might go over to Rome, but his famous 'gunpowder treason' sermon (1638) disposed of them for good and all. In 1643 he was made rector of Overstone, and two years later was taken prisoner by the Parliamentary forces at Cardigan Castle. He settled at Gordon Grove, Carmarthenshire, and wrote his well-known works, *The Liberty of Prophesying* (1646), *Holy Living* (1650), and *Holy Dying* (1651). After the Restoration he was appointed Bishop of Down and Connor, and was also made 'administrator' of the diocese

of Dromore; but his desire for an Eng. bishopric was never gratified, though his claims for such preferment were incontestable. He was one of the most literary of churchmen, and his books are still regarded as among the masterpieces of theological literature, *Holy Living* and *Holy Dying*, in



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particular, having run through many editions. His works were first collected in fifteen volumes in 1822 by Reginald Heber, and there has been a later edition by Eden (1847-1852). The *Poems and Verse Translations* were edited by Dr. Grosart (1870). There is a biography by Heber (1822).

Taylor, John (1580-1653), commonly called the 'Water-Poet,' was b. at Gloucester, England. He achieved notoriety by a number of eccentric journeys, notably the voyage from London to Queenborough in a paper boat, described in *The Praise of Hempsseed*, and the journey from London to Edinburgh on foot given in his *Penniless Pilgrimage*. His *Works* were reprinted by the Spenser Society, 1868-78.

Taylor, Nathaniel William (1786-1858), an American Congregational minister, b. at New Milford, Connecticut. Having graduated at Yale, he became, in 1812, pastor of the First Church of New Haven, and in 1822 professor of theology at Yale. His 'New Haven theology,' long regarded as heretical, maintained the doctrine of natural ability and denied total depravity. His works were

edited and published by Noah Porter, 1858-59.

Taylor, Rowland (d. 1555), an English Protestant martyr, b. at Rothbury, Northumberland. He became chaplain to Cranmer in 1540, and incumbent of Hadleigh, Suffolk, in 1544, becoming archdeacon of Exeter in 1552. He was one of the first to suffer martyrdom in Mary's reign, and was celebrated as the ideal of a Protestant parish priest.

Taylor, Tom (1817-80), an Eng. dramatist, b. at Bishop Wearmouth. He was called to the Bar, but devoted himself to journalism, contributing to *Punch*, of which he was editor in succession to Shirley Brooks from 1874 until his death. Among his books was a work on *Leicester Square* (1874), but he is best remembered as the author of a poor play, *Our American Cousins* (1858), in which Sothorn made a great success in England and America.

Taylor, Zachary (1784-1850), the twelfth president of the U.S.A., b. in Orange co., Virginia. He entered the army in 1808, and in 1812 was placed in command of Fort Harrison on the Wabash, which he successfully defended against the Indians. In 1832 he fought in the Black Hawk War, and in 1836 went to Florida and defeated the Seminoles at Okeechobee Swamp. After the annexation of Texas he resisted the Mexican invasion, winning the battles of Palo Alto and Resaca de la Palma and seizing Matamoros and Monterey, and later gained the memorable victory over Santa Anna at Buena Vista in 1847. On his return he was nominated for the presidency by the Whigs (1848) and elected, just at the time when the struggle over the extension of slavery had begun, and various other party questions were rife, but he died during the Compromise of 1850. Prior to that, though a Southerner and slave owner, he had risen above party by declaring in favour of the admission of California as a state where slavery would be forbidden.

Taylorville, the cap. of Christian co., Illinois, U.S.A., 26 m. S.E. of Springfield. Chief manufs. paper and chemicals. Pop. (1930) 7316.

Tayport, or Ferry-Port-on-Craig, a tn. in the co. of Fife, Scotland, on the shore of the Firth of Tay, 3½ m. E.S.E. of Dundee. It has foundries, engine works, and timber yards, and linen and jute are manufactured. Pop. 3550.

Tchad, Tchernigov, Tchira, Tchelyuskin, and Tchelyabinsk, see CHAD, CHERNIGOV, CHIRA, CHELYUSKIN, and CHELYABINSK.

Tchaikovsky, Peter Ilich, *see* TSCHAIKOVSKY.

Tchekhov (or Chekhov), Anton (1860-1904), Russian novelist, short-story writer and dramatist. Came of peasant stock, his grandfather being a serf who succeeded in purchasing the freedom of his family and became steward to Count Platov at Taganrog. His father, who was always in poor circumstances, was first a clerk and later a shopkeeper at Taganrog, and his mother was the daughter of a Taganrog cloth-merchant. Brought up in an atmosphere of 'dismal' religious strictness which resulted in his having no religion later, though the discipline inspired in him his characteristic knowledge of and sensitiveness to the Russian language. Educated first at a parish school under a coarse Gk. teacher and then at a grammar school, where, at first 'a slow, clumsy and large-headed boy,' he developed, in the upper forms, into a lively, witty youth, the life and soul of his school-fellows, even then writing farces. Had to earn a living as a tutor at the age of sixteen, and then went to Moscow University as a medical student, where very soon he began literary hackwork to keep his father's family from starvation. In 1882 he wrote humorous articles for a paper called *Fragments*, meeting with no success with serious efforts. Ten years later he set up as a doctor near Voskressensk, his experiences in that capacity serving later as a theme for much of his work, especially *The Three Sisters*. His stories *A Horse-like Name* and *Huntsman* in the *St. Petersburg Gazette* attracted the notice of literary celebrities and secured for him an opening in the *Novoye Vremya*, where his work now took on a serious turn, and at last drew him out of the rut of the journeyman. His fame spread rapidly. In 1888 his *The Steppe* appeared in *Severny Vestnik*, the leading magazine, and soon after his *In Twilight* and *Gloomy People* brought him the Pushkin Prize. Generally, however, impecunious, he now worked harder than ever, his health broke down, and he developed signs of consumption. This notwithstanding, he now began writing plays, his first, *Ivanov*, appearing with success in 1887; this was followed by *The Wood Demon*, later produced at Moscow as *Uncle Vanya*. This latter play was not successful, and apart from vaudevilles he wrote no more plays for some years. In 1890-91 he went to Sakhalin for his health, returning to Melikhovo for medical practice. In the next few years appeared his best stories: *The House with the Mezzanine*; *The Black Monk*; *Murder*; and

Mouzhiks, etc. Many of these concern peasant life, which, contrary to convention, he handled realistically, telling the stark truth about village life, and it is from this type of his stories that a vast Russian literature has arisen. He resumed playwriting in 1895 with *The Seagull*, produced at St. Petersburg, a play turning on a complicated love-affair with an attempted suicide. But, though the leading actors and actresses took part in it, it was a failure, yet years later, in Moscow, it was enormously successful. He now went to France for his health, returning to the Crimea, and thenceforth he had to live according to doctor's prescriptions, but bore his illness with courage, while his heart pined for the social glamour of Moscow, where his plays were now playing to great audiences. In 1900 elected a member of the Academy of Sciences. In 1904 was performed *The Cherry Orchard*, his most famous play. The performance was made the occasion of an ovation for T., but in this year his health so declined that he again went abroad, dying in Germany July 2, his body being removed to Moscow for burial. T.'s interpretation of modern culture has been compared with the religion of H. G. Wells, and not inaptly, for he also has it that God is the spirit in the world, that, like transcendental imagination, contrives to make good use of opportunities offered by ever-changing nature. He manifests an increasing interest in subjects of the social order in his works, as in *The Pit* (the problem of prostitution) and in his peasant studies; but he never poses political problems, preferring to be the true artist, showing but not diagnosing the disease. Among his other works are *My Life*, a long story with scenes from Taganrog, 1896, and *The Duel*, 1891. Consult Gerhardt, *Anton Chekhov: A Critical Study*, 1923; *The Life and Letters of Anton Tchekhov*, trans. and edited by S. S. Koteliensky and P. Tomlinson (containing a full bibliog.), 1925; and *Letters on the Short Story, the Drama, and other Literary Topics by Anton Chekhov*, edited by L. S. Friedland, 1924.

Tcherkesses, *see* CIRCASSIA.

Tchernaiev, Mikhail Gregorovich (1828-98), a Russian general. He became prominent first in the Crimean War. In 1865 he reduced Tashkend. He retired in 1874, and for some time edited the Russian journal *Ruski Mir*. He took over the command of the Serbian army, but in 1879 he was involved in political difficulties and sent back to Russia. For some years (1882-84) he was governor of Turkestan.

Tchernigov, or Chernigov, a tn. of Ukrainian S.S.R., Russia, on the Desna, the centre of a fertile area. Pop. 40,000.

Tchernyshevsky, Nikolai Gavrilovich (1828-89), a Russian author, b. at Saratov. He was arrested in 1862 as a propagator of Nihilism and condemned to exile in Siberia in 1864. His novel, *What's to be Done?* was written in prison, other works from his pen being the translation into Russian of Adam Smith's *Wealth of Nations* and Weber's *History of the World*.

Tchikhatchev, Peter Alexandrovitch (1812-90), a Russian geographer and geologist. He was b. at Gatchina, prov. of St. Petersburg, and became an attaché to the Russian embassy in Constantinople in 1842. While holding that position he made several journeys through the Turkish dominions, and recorded his observations in a series of geographical and geological books.

Tchirpan, or Cirpan, a tn. in Eastern Rumelia, Bulgaria, 30 m. E.N.E. of Philippopolis. Pop. (1926) 11,137.

Tchitcherin, see CHICHERIN.

Tea, a beverage used since a remote period in China, but unknown in England until 1645, when it was introduced by the Dutch. Though it at once attracted great interest, it was obtainable only by wealthy people until about 1750. At first it was infused and kept in barrels, being drawn like beer, and warmed for use. In 1660 a tax of 1s. 6d. was imposed per gallon of liquid tea, but in 1680 a tax of 5s. per lb. was substituted. Since 1852, when the tax was 2s. 2½d. per lb., it has been down to 4d. in 1890, and was 5d. just before the Great War. In 1929 the duty of 4d. on foreign and of 3½d. on Empire T. was repealed. The consumption in Britain is about 396,000,000 lb. or 9 lb. per head of the population per annum; of this about two-thirds is Indian T. The first shipment of Indian T. was made from Assam in 1836. T. is derived from *Thea sinensis*, which grows wild in Assam, and was probably introduced from there by the Chinese. The young leaves and shoots, or 'flushes,' are picked from the bushes by women and children. After gathering, they are spread thinly over wire or bamboo trays, and placed in a large house in a temperature of about 80° for two days to wither, when they can be rolled without breaking. This process causes the juice to be exuded, and it is still performed manually in China, though large and hygienic rolling machines have been introduced. The leaf is then spread out thinly on the

floor of a fermenting room, where the air is kept moist, and there in a few hours it changes from a green to a copper colour. It is then 'fired' by being spread out on trays and carried through a hot-air chamber. After being sorted or classified, a process carried on in modern plantations by machinery, the T. is again 'fired' and then packed for export. In making T. the water should be fresh and freshly boiled, and after pouring over the T., should be allowed to stand for three to five minutes, when the T. should be poured off the leaves. Ts. costing up to 1s. 8d. per lb. should make about 220 cups to the lb., while more expensive Ts. make about 280 cups. There are many other methods of using T., and a gargle of T. is strongly recommended for sore throat. More than half the T. exported from T.-producing countries is consumed in Great Britain and Northern Ireland. The U.S.A., Australia, Canada, and Russia are the next largest consumers in the order they appear. Since the outbreak of the Great War internal troubles and national poverty have greatly changed the ability of Russia to purchase this beverage, but in theory, at all events, Russia remains one of the great T.-drinking nations. During recent years T. has gained increased popularity in the U.S.A. London is the chief T. market of the world, and the prices at the London Sale Rooms establish values in every country, with the possible exception of China. This results from the fact that Chinese T. is marketed in a different way from the T. of other lands, the purchases being usually made in China on behalf of importers instead of the T. being exported to London and elsewhere for sale by auction. But even in the case of China, prices are largely influenced by results in the London Sale Rooms. India and Ceylon have over 1,200,000 acs. under cultivation, which produce nearly 700 million pounds of T. per annum. Ceylon T. is increasing in popularity, and the exports of Indian T. have made great progress during the present century. India produces much green T., but exports little. Japan and Formosa have endeavoured to increase their trade in T. during recent years, and at present export nearly 50 million lb. of T. per annum. T. trade has always interested the British merchant and investor, and many of the best plantations of the East, particularly in India and Ceylon, are controlled by British companies. Much also of the continental T. trade is British. For maté or Paraguay T., see MATÉ.

Teachers' Guild, an association of teachers in all branches of the educa-

tional profession in the British Empire. Its aim is to promote the interests of the profession as a whole without regard to grading distinctions. Among its activities is the promotion of holiday courses for British teachers at various Continental centres.

Teachers, Training and Registration of. The training of a teacher is regulated by the code of the Board of Education, and must include (1) an approved course in a training college with the passing of an approved Final Examination, or (2) the passing of an approved Final Examination for a university degree, followed by an approved course of training in the principles and practice of teaching, or alternatively a course of four years of approved practical teaching with the securing of a Teaching Diploma awarded by a university. A training college is defined as an institution established for the provision of full-time courses for persons preparing to become teachers, including a training department in connection with a university or a university college. Candidates for entry into a training college must pass a University Matriculation Examination or a First Examination as defined by the Board of Education, generally a School Certificate Examination of a Schools Examination Board, or the Universities of London, Oxford and Cambridge. A year of probationary teaching must be satisfactorily passed after leaving a secondary school. The course at a training college is two or three years, at the end of which the entrant must pass the Certificate Examination or obtain a University Degree or its equivalent. The course includes, besides the general curriculum, the study of educational principles and practice and child-psychology.

Registration.—A register of teachers is compiled by the Teachers' Registration Council of the Royal Society of Teachers, which was established in 1907, and constituted by Orders in Council in 1912 and 1926. Teachers are eligible for inclusion in the register who satisfy the Council's standards of attainment and training, and it is representative of the whole teaching profession from the headmasters of the leading public schools to the qualified staffs of council schools. The number on the register to date is over 90,000. For training colleges in Europe and America, see TRAINING COLLEGES.

Tears, the secretion of the lachrymal gland. See EYE.

Tebessa (anct. *Theveste*, modern *Tifesh*), a tn. in Algiers, 8° E. long., 33° N. lat., famous for its Rom. ruins. It is the place where St. Crispin

suffered martyrdom and, situated at the junction of the roads to Carthage, Cirta, Lambessa and Tacape (modern Gabes), soon became a place of the first importance, not only from a military, but also from a commercial point of view. T. is not mentioned by Sallust, though it must have been an important Numidian town; nor by Pliny or Strabo; but it figures in later authors, and is commonly assumed to have been founded A.D. 71, just after the Jewish War. Probably one of the first tns. to adopt Christianity after its introduction into Carthage, A.D. 150; and many famous bishops ruled over the church there. Its period of greatest splendour was the commencement of the second century, and from that time there began the construction of its finest monuments. Later, it was razed by the Vandals and disappeared from history until its restoration by the Byzantine armies, Solomon being its second founder. The modern tn.—which is contained within the walls of the Byzantine citadel—is in Constantine province, 11 m. from the Tunisian frontier, and N. of the Mountains of Bon Rouman. It is surrounded by most beautiful gardens; and in front is an immense plain watered by numerous streams flowing into the Oned Chabron. One of the most interesting of its ruins is that of the great basilica, situated 600 yards N.E. of the modern tn. and consisting of a vast edifice 213 ft. long by 72 ft. broad, enclosed by a wall 588 ft. long by 127 broad, strengthened at intervals by square towers, only two of which remain. It is fully described in Lt. Colonel R. L. Playfair's *Travels in the Footsteps of Bruce in Algeria and Tunis* (1877) and earlier by Bruce of Kinnaird.

Technical Education, a system of instruction whose aim is directly utilitarian, especially in relation to productive industries. In the wider sense of the term, any branch of knowledge which is a necessary preliminary to any particular profession or trade is technical, such as the instruction received by medical students, law in connection with the legal profession, the principles of art as studied by artists with a view to their application, etc. For administrative purposes, however, the term is practically restricted to instruction which is calculated to render workmen, foremen, managers, clerks, and others more competent in fulfilling duties in their particular industries. Formerly, technical instruction was received in the course of apprenticeship; the young workman was directly under the eye of his master, and was taught the details of his trade during actual

working hours. Many causes have combined to break up the old institution of apprenticeship, among which may be mentioned the specialisation which has divided many industries into small branches, rendering acquaintance with the industry as a whole difficult to achieve by a person actually engaged in the work, and the modern tendency to 'efficiency' in organisation which makes it difficult to find a place for a person who is at once pupil and workman. It is accordingly found a more useful plan to instruct the would-be worker in the principles underlying his work before he begins to practise them, or, in the case of actual workers anxious to improve their position, to provide for instruction in the evenings after work is over. The growing complexity of many industries demands that efficient technical instruction should be provided so as to commence at a fairly early age, and there is a tendency for the claims of technical education to contend with those of general education to the detriment of the latter. In the provision of technical instruction the following principles are generally observed by modern states. The state itself has a responsibility to modern industry, but the carrying out of details is best left to local administrations. Special schools may be provided for definitely technical purposes, but there is no need to divorce technical from secondary education, if the local conditions are favourable to a combination. The higher branches of technical education, i.e. those that concern the future of an industry rather than the practical needs of the present, should be administered in centralised institutes by the state itself, or by universities or other bodies in direct communication with the state administration. Technical education in general should bear a relationship to local industries. In England, provision was made for technical education by the Technical Instruction Act, 1889, which empowered county and borough councils to levy a rate of not more than a penny in the pound for the support of technical instruction. By the Education Act, 1902, the control of education in general was placed in the hands of county and borough councils, and this Act may be said to have laid the foundations of a system of higher education. The 'Fisher' Act of 1918 carried the system still further, recognising that a course of vocational training requires as a basis secondary education. Many industries admit candidates for apprenticeship at sixteen instead of, as formerly, fourteen years of age, while some concerns prefer a post-graduate pupil

of twenty-one. Day technical schools are concerned with the teaching of the principles underlying the arts and crafts, and to a certain extent provide for the cultivation of dexterity in the use of tools, etc. Evening classes are established for supplementary instruction for those already engaged in industry or commerce. The working-class pupil may thus pass from the elementary school into the technical or secondary school by means of scholarships, or may leave school and attend evening classes after his hours of labour. Technical education in the modern sense began with the formation of the City and Guilds of London Institute in 1830, which was followed by the inauguration of the Regent Street Polytechnic in 1881. Two years later the Finsbury Technical College opened, and in 1887 an Association for the Promotion of Technical Education was formed. By this time there had been issued the Report of the Royal Commission on Technical Education, and by the Local Taxation and Customs Act of 1890 municipal authorities were empowered to administer T. E. up to the cost of a penny rate. Many local technical institutes were consequently established, among the more notable being the School of Technology at Manchester. In 1911 the Board of Education abolished the elementary examinations of its Science and Art Department and the term T. E. received a wider significance. Special development took place among such bodies as the Union of Lancashire and Cheshire Institutes, the East Midland Educational Union, and the Union of Educational Institutes. In 1917 the Board of Education issued Draft Regulations for continuation, technical, and art courses in England and Wales, which had the effect of stimulating the movement still further, and foreshadowed important developments in the future. The recommendations urged that technical instruction should include, besides training in a skilled handicraft, knowledge of the principles which inform it, together with a fostering of the social and intellectual growth of the student. The University Extension Movement and the Workers' Educational Association have done much good work along these lines, while the Federation of Women's Institutes deserves special mention for its successful organisation of handicraft instruction, together with intellectual education, among women in rural districts. Technical Colleges and Institutes are now found in most of the towns of England and Wales. The attendance at those of the London County

Council numbers over three-quarters of a million students, while the day and evening continuation schools have on their registers over a quarter of a million pupils. Industrial groups which have established schemes of technical instruction in their special sphere include the Rubber Growers' Association and the Empire Cotton-growers' Association, while similar work is done by the Air Ministry and the Ministry of Agriculture and Fisheries. In advanced work in scientific research the Imperial College of Science and Technology of South Kensington has a special department where science applied to industry is studied. The college includes the Royal College of Science and the Royal School of Mines. On the continent, however, the differentiation of secondary schools in order to provide various types of professional or trade instruction is carried further than in England, and there is a tendency to make continuation classes compulsory up to the age of seventeen. In America, agricultural and trade colleges are supported by revenue from public lands, while the provision of commercial and trade schools of various types by public and private enterprise is a prominent feature of educational development in most of the states.

The schools providing technical instruction in the U.S.A. may be classed under three headings: (1) those free from state or government control maintained from funds arising from endowments and students' fees; (2) schools which form part of or are affiliated to the universities and which are equally independent of public control; and (3) schools and colleges attached to state universities and maintained by state grants. The institutions in which the highest technical instruction is given are those devoted to the teaching of engineering in all its branches, including mining engineering, and of chemistry in its application to manufacturing industry, besides schools of agriculture, forestry, and design. The Massachusetts Institute of Technology and the Rensselaer Polytechnic Institute are examples of privately owned establishments, and engineering colleges are also supported and administered in connection with the private universities of Yale and Harvard. T. E. in the U.S.A., however, according to Professor Halliday, is hampered in its fullest development on account of the lack of a general standard of secondary education among the students.

Consult *The Schools of England*, edited by Dover Wilson, 1931; Millis, *Technical Education*, 1925; *Humanism*

in the Continuation School—Pamphlet No. 43, Board of Education, 1921; St. John Parry, *Cambridge Essays on Adult Education*, 1920; Dobbs, *Education and Social Movements*, 1919; Draper, *University Extension*, 1923; Mansbridge, *An Adventure in Working-Class Education*, 1920.

Technology (Gk. *τέχνη*, art or craft), the body of knowledge relating to arts and crafts. It includes the history of the development of productive arts, the scientific principles underlying them, and descriptive accounts of processes employed in them.

Teddington, a tn. of Middlesex, England, on the l. b. of the Thames. The National Physical Laboratory (*q.v.*) is situated in the neighbourhood. The first lock on the Thames is at T. Pon. (1931) 23,362.

Tees, a riv. of Eng., which rises in Cross Fell, Cumberland, and flows S.E. and then N.E. through Teesdale, forming the boundary between Yorkshire and Durham. After a course of 70 m. it flows into the North Sea. The tributaries are the Langley Beck and Skerne on the right, and the Breta and the Leven on the left. The river has important ports at Stockton, Thornaby, and Middlesbrough.

Teeth, the calcareous structures occupying the alveolar processes of the upper and lower jaw, and serving to tear, cut, or grind food. The derivation, form, and structure of T. in different animals vary considerably. The cyclostomata are furnished with horny projections by way of T. Fishes generally have well-developed T., sometimes arranged in several rows, as in the shark, whose outer T. are replaced by fresh ones from the inner rows as the old ones become worn. The sturgeon has no T. at all, but the pike is provided with a formidable complement, some of the T. being hinged, so that they are directed backwards while the prey is being held, resuming a more upright position when disengaged. Amphibians generally are not so well provided with T. as fishes. The frog has none on the lower jaw, and the toad has none at all. Reptiles have usually few T.; in most cases they are fused to the bone of the jaw. Turtles have no T. Non-poisonous snakes are furnished with a few sharply curved T. for retaining their prey. Poisonous snakes have special poison fangs arising from the maxillæ; in some cases, as in the rattlesnake, the poison fangs are hinged. Existing birds are without T., but some fossil birds exhibit T. of reptilian form. Mammals are generally well furnished with T. of various forms which are usually classified as incisors, canines, premolars, and molars. In man there

are thirty-two permanent T., sixteen in each jaw. They are divided as follows: Two incisors, one canine, two premolars or bicuspsids, and three molars in each lateral half of each jaw. The incisors have chisel-shaped crowns, and are therefore adapted for dividing food by cutting. In the upper jaw they are socketed in the premaxillary bone. The canine T. are conical in shape, and are therefore adapted for piercing. In carnivorous animals they are developed as sharply pointed T., which serve to tear the prey. The canines are borne behind the junction of the maxillary and premaxillary bones. The premolars have somewhat flattened crowns and bear two cusps, one external and one internal. The first premolar has sometimes two roots, though, like the canines and incisors, it usually has a single root. The molars, the largest and firmest T., are placed behind the bicuspsids. Those of the upper jaw have three or four cusps, while the lower-jaw molars have four or five. The upper molars have usually three roots each, and the lower molars two roots each. The last and smallest molar is known as the 'wisdom tooth.' The arrangement of the T. of any mammalian species is best summed up in a dental formula. Thus the formula for man, $\frac{2.1.2.3}{2.1.2.3}$, indicates

that there are 2 incisors, 1 canine, 2 premolars and 3 molars in each lateral half of the upper and of the lower jaw. In man the structure of all the T. is essentially the same. The outer layer is composed of enamel, a hard substance consisting principally of calcium phosphate and smaller amounts of calcium carbonate, magnesium phosphate, and calcium fluoride. The next layer is composed of dentine which contains the same mineral substances as the enamel with the addition of organic matter. Dentine is hard, though not so hard as enamel; it forms the greater part of the bulk of the tooth, and is furnished with a series of fine channels by which communication is established between its substance, the enamel and the dental pulp. The dental pulp is contained in a cavity within the dentine. It consists of blood-vessels and nervous matter. The root of the tooth is devoid of enamel, but possesses a coating of 'dental cement,' a bony layer which is adjacent to the periosteum of the alveolar cavity. The permanent T. in man are preceded by temporary or 'milk' T. These are fewer in number, smaller in size, and whiter in colour than the permanent T., and they are also somewhat different in shape, the

roots of the molars, in particular, being more divergent than corresponding structures in permanent T. They number two incisors, one canine, and two molars in each lateral half of the upper and lower jaw. They appear usually in the following order: the middle incisors of the lower jaw come between the sixth and ninth month after birth, the incisors of the upper jaw come next, then the remaining lower incisors, then the first premolars, then the canines, and last of all the second premolars. The whole process is usually over by the end of the second year. The permanent first molar appears about the fifth year, and is followed by the permanent middle incisors. About the age of eight the remaining incisors appear; then follow the premolars, the canine, and the second molar at intervals of about a year between each, the second molar appearing at twelve. The third molar, or wisdom tooth, is not cut until much later, the usual age being twenty. The most common disease affecting the human race is probably dental caries. The cause of the disease is the presence of bacteria in the mouth which bring about fermentative changes in starch or carbohydrate food by which lactic acid is produced. The acid disintegrates the enamel coating, after which other bacteria cause putrefactive changes in the organic matter of the dentine, leading to a breaking down of the tooth structure, inflammation of the pulp, and the consequent distressing pain known as toothache. The baneful effects upon general health resulting from defective T. can be successfully obviated only by recourse to the methods of dental surgery. Pyorrhoea also has markedly ill effects on general health. Teeth should be cleaned before retiring, on rising, and after every meal, by brushing up and down, and to and fro, with a curved brush having fairly stiff, uneven bristles. Both back and front should be cleaned with a good alkaline and antiseptic paste, or fine powder. After use, the brush should be rinsed with disinfectant. A dentist should be visited periodically so that incipient decay may be arrested. Consult G. I. Broomell and P. Fischelis, *Anatomy and Histology of the Mouth and Teeth*, 1923; J. H. Mummery, *The Microscopic and General Anatomy of the Teeth, Human and Comparative*, 1924; J. A. Marshall, *Diseases of the Teeth*, 1926; J. S. Wallace, *The Teeth and Health*, 1927. For artificial teeth, see under DENTISTRY.

Teething (A.-S. *toth*, tooth), the eruption or cutting of the first teeth in infants. Man is provided with two sets of teeth, one of which makes its

appearance during infancy and is known as the temporary set or milk-teeth. See **TRETH**. The eruption of each tooth is preceded by swelling of the gum and increased production of saliva, and accompanied by various irregularities in the health of the child which are generally due, however, to improper feeding. T. is accompanied by restlessness at night. The food should be lessened in strength but not in quantity. See W. B. Drummond, *The Child*, and Millicent Ashdown, *A Complete System of Nursing*.

Tegea, an ancient tn. of Arcadia in Greece. In its earliest days it was closely associated with Sparta, but after 371 B.C. became independent. The town was famous for its temple of Pallas Athene (394 B.C.).

Tegernsee, a mountain lake of Upper Bavaria, 27 m. S.E. of Munich, between the two rivers Inn and Isar. The lake is 4 m. in length and has a width of about 1½ m. It is a popular summer health resort.

Tegethoff, Wilhelm, Baron von (1827-71), an Austrian admiral, b. at Marburg in Styria. In 1848 he was present at the blockade of Venice, and commanded the Austrian fleet when the allies were victorious over the Danes at Heligoland in 1864. His most famous victory was obtained on July 4, 1866, over the Italian fleet under Persano, which was bombarding Lissa.

Teggiano (ancient *Tegianum*), a tn. of Campania, Italy, in the prov. of Salerno, 22 m. S.S.W. of Potenza. Pop. 6074.

Tegnér, Esaias (1782-1846), a Swedish poet, b. at Kyrkerud in Vermland. He received a good education, and in 1802 became lecturer in philosophy at the University of Lund. In 1811 he published an ode, *Svea*, which was crowned by the Academy. He is regarded as Sweden's greatest poet. He published in 1820 *Nattvardsbarnen*, in 1822 *Axel*, and in 1825 *Friðhof's Saga*. He established himself also as a critic of considerable ability. In 1812 he had been ordained, and in 1824 he was made Bishop of Vexjö. His later years were overshadowed by melancholia. See *Collected Works* (1882-85), and Brandes's *E. Tegnér* (1878).

Tegucigalpa, the cap. of the republic of Honduras, situated on the R. Choluteca. It is a well-built town, containing a cathedral, central university, military and aviation schools, law courts, national printing works, etc. It is united by a bridge to Comayagüela on the opposite bank of the river. Pop. about 40,000.

Tehama, the name given by the Arabs to the comparatively low-

lying region on the western coast of Arabia.

Teheran, or **Tehran**, a city and the cap. of Persia. It stands in the centre of an exceedingly fertile plain about 60 m. S. of the Caspian Sea. The climate is extremely hot during the summer, but mild and pleasant during the rest of the year. The city is typically Eastern, surrounded by pleasant and well-kept gardens. It is the social centre of the Persian nobles, and not far from here stands the mosque where the Shah Nasr-ed-Din was assassinated in 1896. The city is one of the chief centres of commerce, is the terminus of a railway, and has air services with Bushire and Meshed. Pop. 210,000.

Tehuacan, a tn. of Mexico, in the state of Puebla, and 65 m. S.E. therefrom. It is noted for its mineral springs. Pop. 7498.

Tehuantepec Winds, or **Papagayos**, as they are known on the Mexican plateau, are due to the same influence as the 'nortes' or 'northerners' of the regions round the Gulf of Mexico. The comparative warmth of the gulf in winter and the presence of the continental anticyclone over the central portions of N. America produce unstable conditions; in the gulf are generated cyclones which find a path along the coastal regions of the U.S.A. between the high pressure over the continent and the Atlantic high pressure at its weakest. The compensating current from the N.E. is composed of cold, dry winds from the continent, allied to the mistral or bora of the Mediterranean. They are strong on the Mexican west coast, but weaker on the Pacific, in Nicaragua and Guatemala, where they are known as T. W. from their direction.

Tehuelches, a group of Patagonian tribes, about whose strength and stature somewhat exaggerated reports were given by early explorers. The average height of the males is close on 6 ft., and they have often been spoken of as the tallest race of men.

Teifi, or **Teivy**, a river of Wales, rising in Llyn Teifi, N.E. Cardiganshire. It forms the boundary between Cardiganshire and Carmarthenshire, and after flowing 53 m. enters Cardigan Bay.

Teign, a river of Devonshire, England, rising in Dartmoor, near Chagford; after flowing for 30 m. it enters the Eng. Channel at Teignmouth. Its estuary is nearly a mile across.

Teignmouth, a seaport and market tn. and fashionable resort of Devonshire, England, situated at the mouth of the Teign, 15 m. S.E. of Exeter. Its sea-wall is 2 m. in length. Pipe-clay and china clay are shipped here for the Stafford potteries, and

other industries are boat-building, malting, and fishing—salmon, whiting and mackerel being taken from the Teign. Pop. (1931) 10,020.

Teignmouth, John Shore, Lord (1751–1834), entered the service of the East India Company as a cadet at the age of eighteen. He rose rapidly and was finally made a member of the Supreme Council. In 1793 he succeeded Cornwallis as Governor-General of India. He retired from this office in 1797 and received his peerage on his return to this country.

Teinds. The T. of a Scottish par., like the tithes of Eng. law, are that proportion of rents or goods which goes to the maintenance of the clergy. The clergy, however, have now no right to T. beyond a suitable provision or stipend. Generally speaking, T., like tithes, are a burden on *land*, and most lands, except glebe lands and lands in respect of which the T. have been redeemed, are liable to such burden. According to canon law one-tenth of that which one acquires by one's own industry (*personal T.*) is due by divine right to the Christian clergy; but Scots law requires evidence of forty years' possession of *personal T.* to make good a legal right to them. *Predial T.* are said to be either *parsonage* or *vicarage*; the former being T. of corn due to the parson or other titular of the benefice; the latter being payable to the *vicar* out of cattle, fowl, eggs, etc. *Parsonage T.*, having always been an inherent burden upon all lands not specially exempt, cannot be lost by prescription; but the right to *vicarage T.*, having always rested upon usage, can be lost 'non utendo' (non-user). After the Reformation the whole of the T. were transferred to the Crown, or to private individuals called *titulars* to whom they were granted by the Crown, or to *feuars* or renters from the Church, or to the original founding patrons, or to colleges or pious institutions. In the reign of Charles I. it was provided by arbitral decrees (subsequently confirmed by statute) that T. (up till then payable in kind) should be liable to be valued and the landowner entitled to purchase or redeem them at a certain valuation. This obviated the inconvenience of the titular or patron of T. coming on the land at his leisure and claiming the physical separation of his tenth part after harvest (though there was an alternative method of payment by 'rental-bolls'). Landowners liable to T. may also sue titulars for a valuation or for a sale of their T. T. not so valued or redeemed are still 'drawn in kind.' *Predial T.* are still paid in kind. The Court of Session (*q.v.*) has now taken

over the whole of the jurisdiction of the old Court of T.

Teith, a river of Perthshire, Scotland, formed by the junction of two streams at Callander, which rise near the N. end of Loch Lomond. The scenery is beautiful and romantic in the upper course, and the castle of Doune stands on its banks. In its lower course the water-power is used to work cotton-mills, etc. It enters the Forth 2 m. N.W. of Stirling.

Tekir-dagh, see **RODOSTO**.

Tel al-Amarna, a place or mound in Middle Egypt, between Memphis and Thebes, on the r. b. of the Nile about 180 m. by river above Cairo, with ruins of temple and palace of Amenophis IV., on the site of the anct. Arsinoë. Notable for the discovery in 1887–88 of the 'Letters,' about 300 clay tablets recording correspondence between Egypt and Assyria, Babylonia, etc. In 1891–92 Flinders Petrie carried out further researches. The tablets, which are written in Babylonian cuneiform, throw additional light on the influence of Babylonian culture generally. They indicate, *inter alia*, that Palestine was largely under that influence, referring, as they do, to the 'Khabiri,' a term which includes the Israelites, Moabites, etc. Gezer, too, is mentioned in the inscriptions. See also **AMARNA**.

Telamon, a character in anct. Grecian legend. He was the brother of Peleus, and together with him slew Phocus their half-brother. T. fled from the country and went to Salamis. He married the daughter of the king of that island and ultimately succeeded to the throne. He was one of the heroes of the voyage of the *Argo*, and took part in the adventure of Hercules when that hero took Troy. He was the father of Ajax.

Telautograph, a telegraphic instrument for the transmission of sketches or written messages, the sketch or message being reproduced identically at the other end of the line. The message is written on a roll of paper by means of a pencil. The motion of the pencil is resolved into its component rotary motions, these motions controlling the currents in two separate circuits. The receiver consists essentially of two very fine coils of copper wire suspended in the field of a very strong electro-magnet. The two line currents sent from the transmitter vary the strength of the field of this electro-magnet, thus causing the coils to have a vertical motion owing to electro-magnetic action. This motion actuates a set of levers which transmit the motion to the pencil on the recorder.

Telav, or **Telavi**, an old tn. of Trans-

caucasia, Russia, in the Georgian S.S.R., 80 m. by rail N.E. of Tiflis, on the R. Alazan. It was founded in 893 and possesses numerous interesting ruins of anct. forts, monasteries, etc.; in the near vicinity was the sixteenth-century Ikaltio monastery, and the neighbourhood was formerly much frequented by pilgrims. There is export trade in wine, and silkworms and cattle are reared. Pop. 15,000.

Tel-aviv, a Jewish township situated to the N. of Jaffa. It has been much enlarged under the stimulus of recent Zionist development and presents, in its European modernity of style and life, a striking contrast to the Oriental character of Jaffa. Two large textile factories were erected in 1924. The Palestine Electric Corporation has built a power-house at T., and the transmission lines have been extended beyond the town boundaries to colonies north, south and east, and thus provide energy for lighting, industry, water supply and irrigation. There is a good public library and reading-room. Town planning is in active operation in the neighbourhood. A Levant Fair was held at T. in 1932 under the patronage of the High Commissioner of Palestine. The pop. of T., together with Jaffa, is 48,000.

Telegonus, a son of Odysseus by Circe. When he arrived at manhood he was sent by his mother to find Odysseus. He landed on the island of Ithaca, but was attacked by his father and Telemachus, who imagined him a pirate. He slew Odysseus not knowing who he was, and afterwards conveyed the body to Circe for burial. He married, later, Penelope.

Telegony, see HEREDITY.

Telegraphy (excluding Wireless). Modern T. had its origin in Oersted's discovery in 1819 of the magnetic field produced by an electric current. Fig. 1 shows how a compass needle is deflected when a wire carrying a current is held over and parallel to the needle. If the current is reversed the direction of the deflection of the needle is reversed also. Wheatstone and Cooke applied Oersted's discovery to the invention of the first practicable electric telegraph system. Their first system was a five-needle telegraph requiring five lines. This was followed by the double-

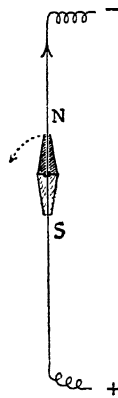


FIG. 1

graph system. Their first system was a five-needle telegraph requiring five lines. This was followed by the double-

needle and then by the single-needle system, the latter being in common use on railways to-day for signalling purposes (see below). The invention of the electro-magnet enabled Morse to invent a simplified system and in 1836 his code, which has been universally adopted.

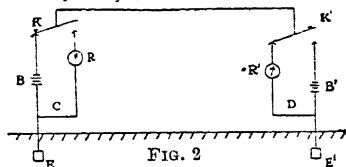


FIG. 2

Morse System.—Fig. 2 represents this system in its simplest form. Let C and D be two stations between which communication is made. B and B' represent batteries, one pole of each being earthed at E and E' respectively. R and R' are the recording instruments—in their simplest form they consist of a single needle that may be deflected to the right or left. K and K' are the transmitting keys. Consider the case where a message is to be transmitted from C to D. The key K is depressed as shown in the diagram to make contact with the lead from the battery B. The current then flows from B along the telegraph wire to K' and through the recorder R' to earth, whence it returns to B. During this operation the recorder R is out of action. Similarly a message may be transmitted from D to C by depressing the key K', the key K now being in contact with the recorder R. During an inactive period both keys are kept in contact with their respective recorders by means of springs, so that a message may be begun at once by either operator. The Morse code consists of two distinct signals arranged in groups to define every letter of the alphabet, numbers, etc. The two signals differ only in their time of duration, one, known as a 'dot,' being a short-period signal and the other, a 'dash,' being a signal of slightly longer period. Fig. 3 gives the Morse Code now used.

A . -	K - . -	U . . -
B - . . .	L . . .	V . . - -
C - . -	M - . -	W . - -
D - . .	N - .	X . . - -
E .	O - - -	Y . - - -
F . . .	P . . .	Z - . . .
G - . -	Q - . - -	5
H	R . . .	6
I . .	S . .	7
J . - - -	T -	8 . - - -
1 . - - - -	3 . - - - -	9 . - - - -
2 . - - - -	4 -	0 - - - -

FIG. 3

The essential features of the *Morse Sounder*, the receiving instrument, are shown in Fig. 4. It consists of a U-shaped electro-magnet *M*, and a soft iron bar *A* which is attached to

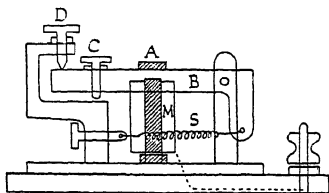


FIG. 4

a brass bar *B*. The brass bar is pivoted so that its free end can move up and down; this end is normally kept up by the spring *S*. When the signal current flows through the electro-magnet, the iron bar *A* is attracted, and the screw *C* strikes the brass frame. When the current ceases, the spring pulls the bar up again, and its end strikes the screw *D*. The person at the receiving end hears the two taps, which have different sounds. If the interval between them is short, the signal is a dot, if long, it is a dash. Messages may be received on a modified form of sounder, when there is no one available to take the message directly. Fig. 5 gives an idea of the method adopted. *M* is the electro-magnet, with its central core of soft iron, *P* is the pivot of a lever with a soft-iron armature *I* mounted above the electro-magnet. A style *S* is attached to one end of the lever and the two stops *T* control the range of motion of the lever. A roll of paper *R* driven by a clockwork arrangement passes slowly over the face of a roller *N*. When the electro-magnet *M* is excited by the signal current,

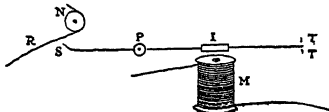


FIG. 5

the armature *I* is attracted and the lever turns about *P* and presses the style *S* against the paper. When the signal current ceases, the lever springs back to its normal position, removing the style from its contact with the paper. In this way the dots and dashes are recorded on the moving

strip. When the person receiving the message is present, the taps against the stops *T* record the message in the manner described above. Siemens and Halske invented an improved form of ink-writer in which a small disc attached to the lever is rotated automatically in the opposite direction to which the paper moves. The disc revolves in a reservoir of ink, so that when the armature is attracted by the electro-magnet, the disc is raised to make contact with the paper.

Automatic Systems.—High-speed automatic systems are in use to-day both in the G.P.O. and on the main trunk lines of the railways for sending commercial and private telegrams. The *Creed* system, that enables the operator to sit before a typewriter keyboard and tap out a message at the rate of sixty words a minute, delivers the printed message on a strip of paper that is directly pasted on the telegram form for delivery. This system had its origin in the *Wheatstone* automatic system, in which the message is prepared on a strip of paper by a machine that perforates the paper according to the long and short signals of the Morse Code. This perforated strip is run through an automatic transmitter, which results in corresponding currents being transmitted along the line. The receiver consists of a standard relay, with a tongue carrying an ink wheel which writes on a moving strip of paper. The paper runs through the machine at a very high speed, and the message is translated by several operators. Modern forms of this system are in use for the transmission of press news, and the receiving office includes a translator that is synchronised with the transmitter; the perforated strip passes into the translator and the original message is delivered. In long-distance transmission the signal currents are enfeebled by reason of the resistance of the line and leakages due to faults or bad insulation. This difficulty is overcome by using a relay. The signal currents are sufficiently strong to operate this very sensitive receiving instrument. The relay gives out no audible sounds, but the movement of its armature corresponds to that of the receiver it displaces. By this movement it opens or closes a 'local' circuit, in which the actual receiver and battery are placed. Fig. 6 shows a simple local circuit of this type. The relay *R* actuates the key *K* and so opens or closes the circuit of the battery *B*. This causes the armature of *S* the receiver to perform the requisite motions for the message

to be received. The simplest relay is that of the *non-polarised* variety, i.e. it is not permanently magnetised. It takes the form of an electro-

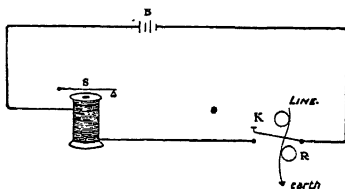


FIG. 6

magnet that is excited by the passage of the line current through the coils. The absence of any permanent magnetism detracts from its sensitiveness, and thus the Post Office standard relay is of the *polarised* variety. In this relay the iron cores of the electro-magnet are polarised by a permanent horseshoe magnet. Fig. 7 gives an outline of the standard relay. The poles of the electro-magnet are marked in the diagram. Behind them is placed the permanent magnet with its S. pole just behind the N. poles of the electro-magnets and its N. pole just behind the S. poles of the electro-magnets. Between the poles are the soft iron tongues *T* attached to a brass spindle. The presence of the permanent magnet induces magnetism in these tongues, and hence the end of the top tongue will have a S. pole and the bottom tongue a N. pole, these poles being situated between the poles of

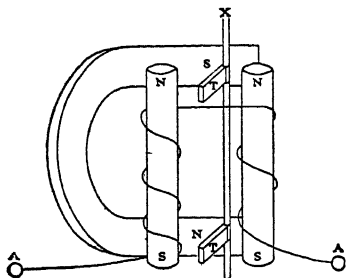


FIG. 7

the electro-magnet. The spindle is free to rotate, and thus the tongues may move towards the left or right when attracted by the electro-magnet. In the normal state when the electro-magnet is not excited by the passage

of a current, magnetic poles are induced in the iron cores by the iron tongues, the polarity being opposite to the inducing polarity. A current entering at A will tend to reduce this polarity in one core and increase it in the other, and thus the tongues are attracted to one side and cause the spindle to rotate. This spindle actuates a contrivance to close the 'local' circuit. The sensitiveness of the instrument is clearly made very high, owing to the presence of the four pole pieces. All the above systems may be made to work in both directions at the same time on only one wire by means of the *Duplex Method*. The differential duplex depends on the following principle. Suppose an iron core is wound by two wires of equal resistance in opposite directions, each wire being connected to a battery. If the current supplied by each battery is equal in value, their magnetic effects on the iron will neutralise each other and the electro-magnet will remain unmagnetised. If the two currents are not equal, the amount of magnetisation produced will depend on the difference of the two currents. Fig. 8 shows how this principle is applied in working. The stations are designated 1 and 2, the corresponding parts having these numbers as suffixes to the letter denoting the part. The circuit after leaving the key *K*, divides into two parts, one wire going round the electro-magnet *M*, in one direction through the resistance *R*, which is equal to the line resistance, back to the battery. The other wire winds around *M*, in the opposite direction and connects to the line wire and thence to the second station, where the arrangements are similar. If only one station is transmitting, then since *R*, and the line resistance are equal *M*, is unaffected, and since only one wire of *M*, is closed, then the receiving instrument will be affected. If both stations work together, since the resistances of both stations are the same when both keys are depressed, clearly the currents in the line wire annul each other, the receiver in each station then being worked by the currents through *R*, and *R*, these currents being called the *compensating currents*. Another important duplex system is that due to Wheatstone, which depends on the Wheatstone bridge principle. If a double-current sounder be utilised and the above employed, the resulting system may be made *quadruplex*, i.e. eight operators may be at work on one line, four transmitting and four receiving. *Multiplex* working admits of six messages being transmitted simultaneously on the same

line. Other systems are in use which employ two signals which differ from one another by their positions. It has been noted that when a current flows in a coil of wire, a needle placed on the axis of the coil will be deflected. Consider an ordinary galvanometer: When the current is

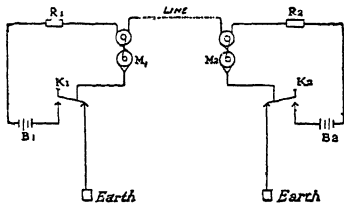


FIG. 8

sent through the coils, the needle will be deflected to the left of the observer, say. When the current is reversed, the needle will be deflected to the right. These two positions correspond to the 'dot' and 'dash' of the Morse Code, the left-hand position for the 'dot' and the right-hand for the 'dash.' The receiving instrument is very similar to this single-needle galvanometer. This receiver has the disadvantage that the operator has to read both the signals and his own writing at the same time. To surmount this difficulty, the needle is made to strike against two metallic plates, one on each side; sometimes a double-sounder principle is employed, which gives not only the different positions, but also different sounds, corresponding to the different positions. It will be observed that a double current is necessary to actuate the needle. The *drop-handle* form is the one generally used with this type of instrument. The handle, Fig. 9, consists of two parts, *A* and *B*, insulated one from the other, the positive pole of the battery being connected to *A* and the negative pole to *B*. *S*₁ and *S*₂ are steel springs, *a* and *b* are metal projections from *A* and *B*. When the handle is at rest *a* and *b* rest between the springs *S*₁ and *S*₂ without touching either, but when the handle is moved to the right, say, *b* makes contact with *S*₂ and *a* with *S*₁. If the handle is moved to the left, *a* makes contact with *S*₂ and *b* with *S*₁, and thus by moving the handle to right and then to the left the direction of the current can be reversed. This type of instrument has largely gone out of use; it is now chiefly employed on railways. This method is, however, employed in signalling through long

submarine cables. These cables act like condensers, and thus the currents which are sent into the line quite distinct from one another flow into each other before they reach the receiving instrument, and it would require such a very high electromotive force to actuate the instruments at the end of a long cable that the safety of the cable would be to a large degree sacrificed. The reflecting galvanometer introduced by Lord Kelvin indicates a signal when there is the slightest variation in the current. The signals are produced by a double-sending key as described in Fig. 8. The reflecting galvanometer has now been replaced by the syphon recorder. This instrument is made very similarly to the D'Arsonval galvanometer. It consists essentially of a movable coil which is capable of oscillating between the two poles of a permanent magnet. When reversed signals are received the coil oscillates and by means of a thread causes a corresponding movement in the syphon. This syphon consists of a thin glass tube, one end of which dips into a vessel containing ink, while the other touches a strip of paper, it being so arranged that this end is free to move across the strip of paper. The oscillations of the coil cause the syphon to vibrate, and the ink is thrown on to the paper in small dots. As the paper is made to travel onwards, the syphon will trace out a curve, and thus the movements of the coil will be recorded. The electro-magnetic alphabetical telegraph of Wheatstone is widely used in Britain. It consists of a large number of keys arranged on a circular dial, each key corresponding to a letter, punctuation mark, etc. The receiving instrument consists of a pointer which can

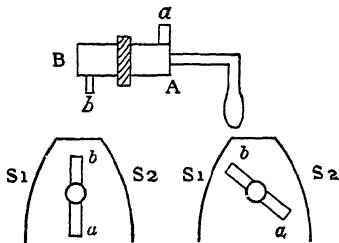


FIG. 9

rotate over the face of the dial, having letters, etc., printed on its face. This pointer moves from letter to letter by steps, the motion being regulated by a ratchet motion. This motion is

worked by the armature of an electro-magnet which is actuated by the current regulated by the sender. By depressing one of the keys, the sending operator cuts off the current until that key is again raised. In this way the message can be spelt out at the receiving station. Hughes's recorder is still largely used on short cables and in France. This consists of a large number of keys, each corresponding to a letter, etc.; the depression of any particular key causes a type wheel to record the letter, etc., at the receiving station. This recorder differs from that of Wheatstone in that the Wheatstone is non-recording, whereas the Hughes machine records the message. Further, the Hughes machine admits of duplex working. Writing telegraphs are rapidly being adopted in the G.P.O. and railway services, the Creed instrument being very popular; the rate of operation of this type of instrument is not very high. Two line wires are required. In the Hughes machine the sender writes with a stylus and this causes variation in the resistance of the instrument. This variation causes a corresponding variation in the strength of a permanent current flowing in each line, which gives rise to differential magnetic action at the receiving station and so actuates a writing pen to record the signs on a strip of moving paper. The action of instruments which transmit writing, diagrams, etc., depends upon electrolytic action. At the sending station the writing is placed on a sheet of tin foil in insulating ink. This sheet is placed on a rotating cylinder, a metallic stylus connected to the line being in contact with it, and also connected to one pole of a battery, the other pole being connected to the tin foil and the earth through the cylinder. The receiving instrument is similar in construction, the actual receiving part being a piece of damp chemically prepared paper. Both the sending and receiving cylinders rotate together with the same motion. When the stylus moves on the tin foil, the shunt circuit through the stylus and tin foil operates, and there is no current in the line, but when the stylus moves on the insulating ink, the shunt circuit is cut out and the current passes through the line to the writing pen and hence through the damp paper. Electrolytic effects are thus produced and the writing is marked on the paper.

Telegraph Lines.—The open lines have been most generally used, owing to their lower cost, better electrical condition, and being more easily accessible than cables which are placed underground. The open lines

consist of bare iron or copper wire suspended from wooden poles by the side of railways, roads, and canal banks. In large tns. the choice lies between overhouse or underground. The overhouse system presents difficulties of accessibility, and also the lines must be placed about 40 ft. high when crossing over thoroughfares. Often covered lines are suspended by point to point supports through the air, but are mostly buried underground in pipes or led through railway tunnels or other subways. On open lines each end of the wire is bound at the support to an insulating cup generally made of porcelain. In drier atmospheres than that of Britain glass is sometimes used. The supports consist of wooden poles, preserved by some chemical process; to these wooden poles an iron wire is fixed from the ground to above the 'roof' and branching off to the various arms on which the insulators are fixed. This wire is used to minimise lightning effects and for carrying stray currents to the earth. Iron poles are used in tropical countries owing to climatic conditions, transportation difficulties, and the attack of insects.

For T. systems see under **Post Office**; also **UNITED STATES—Communications**; for *Submarine Cables*, see **CABLES**. See Herbert, *Telegraphy*, 1926.

Telegraphy, Wireless, see **WIRELESS TELEGRAPHY**, and **ELECTRICITY—Electro-magnetic Waves**.

Telemachus, the son of Odysseus and Penelope. Left as a child when his father set out for the war with Troy, after his father's absence had lasted for about twenty years he set sail in search of news of him. He visited Pylos and Sparta, and returned to Ithaca in time to help his father in the famous fight with the suitors. He succeeded Odysseus as King of Ithaca. (Homer's *Odyssey*.)

Telemeter, see **RANGE-FINDERS**.

Teleology, see **KANT** and **HEGEL**.

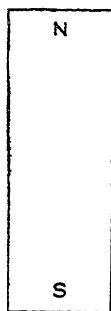
Teleosteans, or **Teleostei**, see **BONY FISHES**.

Telepathy, see **PSYCHICS**.

Telephone Bells, see **ELECTRIC BELLS** and **ALARMS**.

Telephony (excluding **Wireless**), a system of reproducing sounds at a distance by the agency of electricity. The possibility of T. originated with Faraday's discovery of electro-magnetism, and the problem of converting sound energy into electrical energy at one station and reconverting electrical energy into sound energy at another station was first solved by Bell at Boston, U.S.A., in 1876. Bell's system consisted essentially of a transmitter, a line wire and a receiver,

and his transmitter and receiver were similarly constructed. When the number of lines of magnetic force threading a circuit changes, an induced electromotive force is set up in that circuit (see *ELECTRICITY*). Bell's receiver and transmitter consisted of a thin soft-iron diaphragm *P* situated close to a permanent magnet (Fig. 1). A coil of wire was placed in the gap between them with its plane parallel to the diaphragm,



P

FIG. 1

so that the lines of magnetic force threaded the circuit. When *P* was caused to vibrate under the influence of the sound waves created by a human voice, the number of lines of magnetic force threading the coil fluctuated correspondingly and an induced E.M.F. was set up in the coil. The latter was connected in series by a line wire with a similar coil situated between the magnet and diaphragm of the Bell receiver, and the fluctuating currents therefore passed through this second coil. Hence in the receiver the attraction of the diaphragm by the magnet was modified by the fluctuating magnetic field of the current in the coil, and the diaphragm therefore vibrated in harmony with the diaphragm of the transmitter. In this way the electrical energy was reconverted into sound energy at the receiver and the original sounds were reproduced. Bell's transmitter and receiver is shown in Fig. 2. *P* is the soft-iron diaphragm and *C* is the coil connected to the terminals *TT*. Bell's system was extended to form a telephone exchange of some twenty-one subscribers. The disadvantages of the system are as follows: (i) the

electrical energy is derived solely from the sound energy of the waves emitted from the speaker's voice; (ii) the resistance of the coils and lines becomes considerable when the distance of the receiver from the transmitter is great, so that the currents set up in the circuit are very feeble, with the result that audibility is poor; (iii) only a small fraction of the sound energy is converted into useful electrical energy, the major portion being dissipated as heat energy by friction in the diaphragm and in heating the coils. These disadvantages have been overcome in modern *T.* by altering the design of the transmitter, so that the electrical

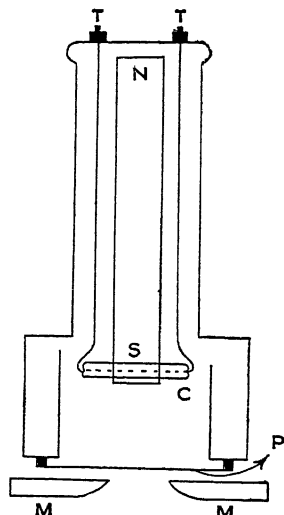


FIG. 2

energy is derived from a battery, and the sound energy merely causes fluctuations in the electrical energy delivered at the receiver. The transmitter or microphone now used is of the form shown in Fig. 3. The diaphragm is a thin carbon disc held in a metal ring; the central part of the diaphragm presses lightly against the carbon granules in the capsule. The arrangement of the circuit is shown in Fig. 4, where the receiver is a modified form of the original Bell receiver. A steady current from the battery *B*, passes through the transmitter. When sound waves fall on the transmitter the diaphragm

vibrates and compresses the carbon granules, and the resistance of the capsule varies correspondingly. Thus a fluctuating current passes round the microphone circuit. T_1 is a step-up transformer (q.v.), so that the

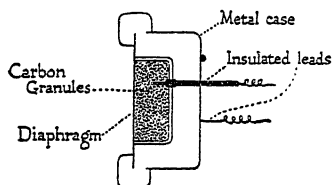


FIG. 3

fluctuating microphone E.M.F. creates an induced E.M.F. in the secondary of the transformer and this E.M.F. fluctuates in harmony with the primary E.M.F., though its magnitude is considerably greater. The secondary circuit includes both receivers,

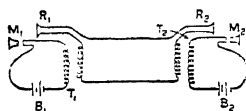


FIG. 4

and the diaphragm of R_2 is therefore set vibrating whenever sound waves fall on the microphone M_1 . Similarly, a speaker at M_2 causes the receiver R_1 to vibrate and reproduce the message to an observer stationed there. In this system distance is no object, for the energy is drawn from a battery; hence 'trunk' calls may be made quite easily.

Practical Systems.—The simplest case is that of telephoning between two stations. The only requirements are transmitters, receivers, call bells, batteries, and the line wire. The return circuit may be made through the earth. The same battery may operate the call bell and the microphone transmitter, and the switch for cutting the receiver or bell out of the circuit works automatically as follows. The receiver is supported by a hook that is depressed by the weight of the receiver. The bell is then in circuit and is ready for action. When the receiver is taken up in response to a call, the hook rises and cuts the bell out of the circuit and completes the receiving circuit. When several stations are to be

connected, each set is connected by a wire to every one of the others. In large tns., where there are numerous subscribers, each is connected to a central exchange by a separate wire. Each wire passes through an indicator, which signals a ring up, the wire terminating in a small 'jack' or spring. These jacks are all mounted on a switchboard, each jack having its number and capable of being connected to any other jack by means of a flexible wire. This method is useful for a small central station, but when the number of subscribers is large it would lead to confusion. In large stations the 'multiple board' system is utilised. The subscribers are classified into groups of two or three hundred on one board, each board being worked by one operator. Each operator has in front of him the indicators for the subscribers on the board he controls, a jack also being provided for each subscriber. In this way a subscriber may be connected to any other by passing along the boards. On the trunk wire system for connecting dists. the trunk wire terminates at each exchange, and so may be connected to the jacks on the exchange. Fig. 5 illustrates the connection from the exchange to a subscriber. Here it will be observed that the whole apparatus is worked by the battery at the central exchange (marked B in the figure) and the subscriber's jack which fits into the socket S . The subscriber's portion consists of the magnetic bell b , a condenser c , receiver R , the microphone M , and the frame F supporting the receiver. The diagram shows the apparatus when not in use. The frame F makes or breaks the circuit through R at s . When R is taken off the frame, contact is made at s ; in the position shown there is a break at s , the bell being in the circuit ready for action. The condenser c is used for cutting off the continuous current from the central battery. All subscribers are joined up to the central exchange in this way, all the lines being joined across the same battery, which consists preferably of accumulators. The condenser c prevents any current from the battery flowing through the bell circuit, and thus a dynamo is employed at the central station to work the bell through the condenser. The terminals of the dynamo are connected to the operators' desks, so that any subscriber can be called up by pressing the corresponding button. If the subscriber wishes to call up the exchange, he simply removes the receiver off the frame and thus makes a complete circuit through s for the battery at the exchange. This works a relay at the

exchange and so lights up an electric lamp, a lamp being placed in the circuit of every subscriber. The lighting of the lamp indicates that a call has been made from that subscriber. The jacks used in each subscriber's circuit consist of three parts: a long spring, a short spring, and a ring which fits into the woodwork of the switchboard. The two springs make contact with the line wires, while the ring connects with a relay. Each of the three parts is insulated one from the other, and they are placed so that they make contact with corresponding parts of the switch springs. The operator has two of these jacks, one is the calling

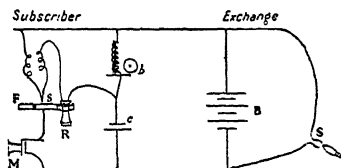


FIG. 5

jack and the other the answering jack. The jacks, when put into the switch springs, bring into action the battery and connect the necessary circuits. In each of the circuits relays and lamps are introduced, which can be worked by either subscriber concerned, indicating after the restoration of the receiver to the frame the end of the conversation.

Automatic Systems.—The essential feature of the modern automatic systems is the elimination of the operator at the exchange as a liaison between the two subscribers. The apparatus required to achieve this purpose is complicated, and the reader is referred to the bibliography at the end of the article. A detailed course of study is required to comprehend the intricacies of the problems involved. Such systems have to provide for (a) the automatic selection of the required subscriber according to signals dictated by the caller; (b) the automatic ringing of the call bell of the required subscriber; (c) the disconnection of the call bell and the completion of the circuit between the two subscribers as soon as the call is answered by the lifting of a receiver; (d) the automatic signalling to the caller when the line is engaged; (e) the disengagement of both subscribers when the receivers are replaced.

Statistics.—The telephone service in Great Britain is controlled by the

G.P.O., which took over the National Telephone Co.'s undertakings on Jan. 1, 1912, and thereupon from that service was £22,600,000 in 1931. According to *Whitaker's Almanack* for 1932, there were 2,000,000 telephones in Great Britain in 1931. At the end of Dec. 1929, the numbers of telephones per 100 of pop. were as follows: U.S.A. 16.5; Canada, 14.2; New Zealand, 10.8; Denmark, 9.4; Sweden, 8.3; Australia, 8.2; Norway, 6.6; Switzerland, 6.5; Germany, 5.0; Great Britain and Northern Ireland, 4.2.

Telephones in the U.S.A.—The U.S.A. is by far the greatest user of Ts. in the world. Whereas in most European countries the T. is a gov. monopoly, in the U.S.A. its development is entirely due to private enterprise. In the early days, before the development of long-distance telephony, when the use of it was largely a local matter, there were often two rival companies in the same city. At first the citizens liked this, because they deemed that competition would ensure good service. But it was soon found to be inconvenient as well as costly. Business and professional men had to subscribe to Ts. from both companies because one set of their clients might be on one line and another set on the other. Hence in the past twenty years there has been a tendency to consolidation, so that there is only one company operating in most cities. The greater part of these are linked up with the great American Telephone and Telegraph Company, which has thus been enabled to use its huge resources in perfecting its system. To-day in the U.S.A., by contrast to most other countries, the T. is considered, not as a luxury, but as a necessity. Even modest homes and flats, as well as thousands of farm-houses, have their T. service. In 1927 the T. wire mileage was 63,836,182, of which 23,943,170 m. were overhead and the balance underground. By 1929 the mileage had increased to 75,728,559. In 1927 55,840,231 m. were exchange wires and 7,995,951 were devoted to toll calls. Of the 18,522,767 Ts. in use one-third were in business houses, the rest in residences. By 1930 the number of Ts. had risen to over 20,000,000. T. conversations numbered over 27,200,000,000, more than in all the rest of the world put together. The extent to which Ts. are used is indicated by the fact that New York City has 1,702,889, or almost as many as Great Britain in its entirety; Chicago has 942,015, or almost as many as France as a whole. Over 364,000 persons were employed in the T. business. The

extension of the long-distance T. was made fairly rapidly to the eastern, southern, and middle-western states, but it was only in 1915 that it was possible to T. through from New York to San Francisco. This was due to mechanical problems of current strength and mountain conditions which were finally overcome. Now the whole country is united by a vast T. network, which is also connected with those of Canada and Mexico by land wires and with Cuba by a cable from Florida to Havana.

The American Telephone and Telegraph Company, working in harmonious conjunction with the British Post Office, in 1927 opened a transatlantic T. line. The messages go over the ocean by radio. The rest of the various distances is covered by land wires. At first only New York and London were in telephonic communication. Gradually in the U.S.A. the service was extended from New York to every part of the country. On the European side the British Post Office extended the service over the British Isles and then linked up with most of the countries of Europe, so that now it is possible to talk from most places in Europe to almost any tn. in the U.S.A. The main connecting stations still remain New York and London.

An important side-line of the T. system in the U.S.A. has been of enormous advantage to the newspapers which wished to have news pictures of important events within a few hours of their occurrence. The American Telephone and Telegraph Company installed an elaborate apparatus for the sending of telephoto pictures. There are some half-dozen important key cities from and to which pictures can thus be transmitted. A picture can be filed at one of these cities and duplicated to one, some or all. For instance, if a news picture is filed at San Francisco it may be sent direct to only New York. If distribution is wanted for the middle-west, it can also be sent to Chicago at the same time. If distribution is wanted in the south, it can at the same time be sent to Atlanta, and all by one operation.

See Herbert, *Telephony*; Hudson, *The Director System of Automatic Telephony*; Ellison, *Automatic Telephones*; Poole, *Practical Telephone Handbook*.

Telescope. The first T. was probably made by the Dutchman Lippershey in 1608, although Galileo in 1609 constructed the first of his famous Ts. and commenced astronomical observations at the beginning of the year 1610. Roger Bacon, who lived during the thirteenth

century, is often credited with the invention of the T.; while this statement is erroneous, it is remarkable to notice that the germ of the function of a T. is contained in his writings: 'So a boy can appear a giant, a man seem a mountain, and in any size of angle whatever, for we can see a man under as large an angle as though he were a mountain, and make him appear as near as we desire.' The apparent size of an object depends solely on the angle it subtends at the eye; thus a sixpence may appear as large as or larger than the sun if it is held at such a distance that it subtends an angle at the eye as great or greater than does the sun. The function of a T. is then to increase the angle subtended by an object at the eye, and as a result two things are judged to occur: (i) the object seems magnified, (ii) the object seems to be brought nearer. The effect is, of course, a subjective one, for if we view a man 1 m. away through a T. and find that he appears to be six times as tall as when viewed by the naked eye, we estimate his distance as $\frac{1}{6}$ m.

Magnifying Power.—The magnifying power of a T. is defined as the ratio of the angle subtended at the eye by the image viewed through the T. to the angle subtended at the naked eye by the object. Field-glasses commonly have a magnifying power of eight, while some of the finest astronomical Ts. have magnifying powers of the order of 1000. With such an instrument, the moon, situated some 250,000 m. away, presents the same appearance as it would to the naked eye of an observer 250 m. from the moon. The principle of the simple astronomical T. can be understood by referring to Fig. 1. It consists of a convex lens of long focal length, called the *objective*, and a convex lens of short focal length called the *eyepiece*. In order to show quite plainly how it works, we have taken a parallel beam entering the objective in a direction inclined to the axis of the T.; such a beam would, for instance, fall on the T. from the edge of the sun when the axis of the T. was pointing at the centre of the sun. The objective forms a real, inverted image at *F*, below *F*, its principal focus, and the eyepiece is moved so that *F* is at a slightly smaller distance from it than the focal length of the eyepiece in order to form an image at *X*, 25 cm. away from the eye, i.e. at the least distance of distinct vision. Without the instrument the angle subtended at the eye by the radius of the sun would be $\angle SCO$, but with the instru-

ment, the angle subtended by the radius of the image of the sun is increased to \widehat{CEX} ; hence the sun appears to be greatly enlarged. The objective and eyepiece are mounted in a tube whose walls are blackened on the inside to prevent confusion arising from light reflected by the walls of the tube. The instrument described above has two serious defects, viz. the image suffers from *spherical aberration* (*q.v.*) and *chromatic aberration* (*q.v.*).

or refracting T. Various forms of eyepieces are used instead of the single convex lens in order to obtain greater magnification without the defects of aberration.

Galileo's T. is the prototype of modern opera-glasses. The astronomical T. produces an inverted image; this is immaterial for astronomical observations, but it renders the instrument useless for terrestrial work. The simple pattern of the Galilean T. is shown in Fig. 2. The objective

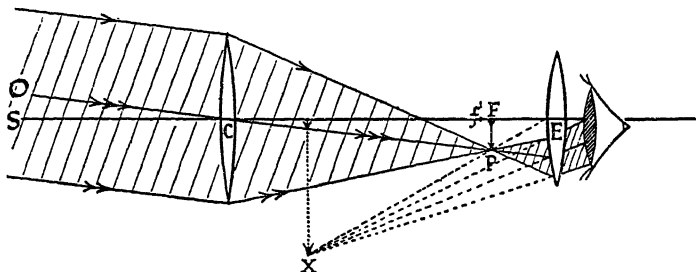


FIG. 1

ration (*q.v.*). Spherical aberration arises from the fact that a point object does not give rise to a point image when a single lens is used. The defect can be remedied by using stops and by using a compound lens. Chromatic aberration is due to the fact that the focal length of a simple lens is different for each of the coloured components of white light. The image produced is tinged with colours at its edges. The attempts to remedy this defect were completely unsuccessful

is a convex lens of long focal length, and the eyepiece is a concave lens of short focal length. The rays from the objective converge towards a point behind the eyepiece so that the object for the refraction at the concave lens is a virtual object. The final image formed by the concave lens is at XY , a virtual and erect image. The eye has, of course, been enlarged in the diagram for convenience. This instrument requires correction for spherical and chromatic

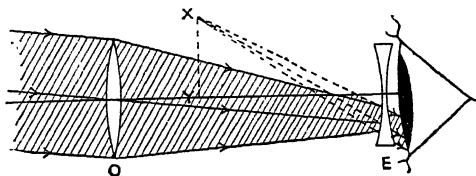


FIG. 2

ful until 1758, when Dollond discovered an achromatic combination consisting of a convex lens of crown glass placed in contact with a weaker concave lens of flint glass that partially corrected the dispersion produced by the convex lens, the combination behaving as a weaker convex lens. Since that time, the study of achromatic combinations has made so much progress that the Yerkes T., the second largest in the world, is constructed on the essential principles of the simple astronomical

aberration in a similar way to the simple astronomical T.

Reflecting Telescopes.—Newton despaired of making a refracting T. free from chromatic aberration, and he designed the first reflecting T. on the lines shown in Fig. 3. M is a concave mirror of large radius of curvature; its principal focus is at F . Light from a distant star is reflected at M and the reflected beam converges towards I , a point vertically below F . A plane mirror m inclined at 45° to the axis of the

instrument intercepts this beam and the real image is formed at f . This image is viewed by the eyepiece and the final image seen by the observer is a virtual one at I' .

All subsequent reflecting Ts. were modifications of Newton's, a famous one being that of Herschel, the great British astronomer of the eighteenth

century, compensates for the fact that four times as much light enters the eye under the most favourable conditions. This statement, however, does not apply to the case of stars, whose apparent size is so small that diffraction effects are produced (*see below*). Under the best conditions the apparent brightness of stars viewed through

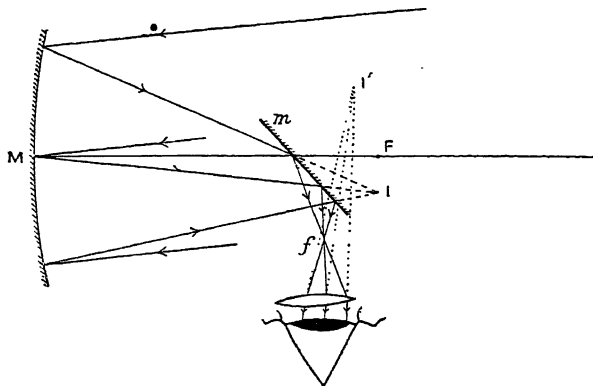


FIG. 3

century. The 100-in. T. of the Mount Wilson Observatory, the largest instrument to-day, is a reflecting T. The mirror instead of being truly spherical is 'parabolised' in order to avoid the aberration of a spherical mirror and it is silvered on its front surface by a process of chemical deposition. In this way the silver can be renewed whenever desired.

Brightness of Objects Viewed through Telescopes.—In no case can objects such as the moon or sun appear brighter through a T. than they do when viewed by the naked eye, and if the losses of light by reflection or refraction are taken into account, the apparent brightness of such objects is actually diminished when viewed through a T. The size of the image formed on the retina varies inversely as the square of the distance of the object viewed, and this enlargement of the image of the sun or moon formed on the retina exactly compensates for the increase in the amount of light entering the eye, which also varies as the inverse square of the distance of the object. In other words, if a T. has a magnifying power of two, the area of the image formed on the retina will be four times that of the image formed on the retina of the naked eye, and this exactly

a T. varies directly as the square of the diameter of the objective, and with the largest modern Ts. stars appear 100,000 times as bright when viewed

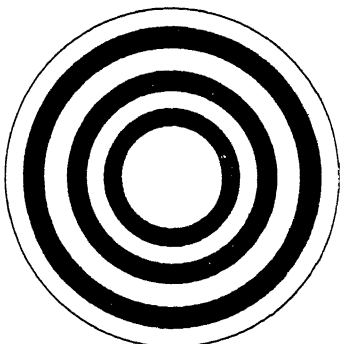


FIG. 4

through the instrument. As the brightness of the sky is not increased it is possible to view stars in daylight.

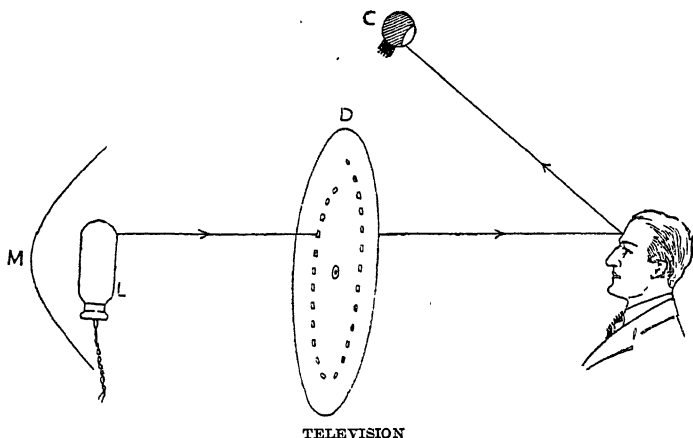
Resolving Power of a Telescope.—The appearance of a star through a T.

is similar to Fig. 4; a central bright disc of light is surrounded by alternate dark and bright diffraction rings, three of which are shown in the figure. Two stars can be recognised as distinct stars, provided that the centre of the bright disc of one falls on the first dark ring of the other. If the stars are closer than this they cannot be distinguished as separate stars; if further apart, they are the more easily distinguished. The limit mentioned is known as the limit of resolution. It can be shown that the angle subtended at the centre of the objective by two stars that can just be resolved is $\frac{1.22\lambda}{D}$, where

the spectra are photographed. Cameras are fitted to Ts. in all observatories, as it is possible to obtain prolonged exposures of any part of the heavens by means of a clockwork coelostat arrangement that keeps the instrument directed to a given area of the sky. Photographic records taken in this way reveal much more information than may be obtained by ordinary visual observation.

See Baikie, *Through the Telescope*; Proctor, *Half-Hours with the Telescope*, 1926. See also ASTRONOMY, LENSES, etc.

Television (Gk. *tele*, at a distance), vision at a distance. The term T.



TELEVISION

λ is the wave-length of the light and D is the diameter of the objective. Hence the greater D is, the greater the resolving power of the T.; in point of fact, the above fraction is adopted as the quantitative measurement of the resolving power of a T. The Yerkes T. can resolve two stars that subtend an angle of only $\frac{1}{4}$ in. at the centre of its objective. Michelson (*q.v.*) invented a form of interferometer (*q.v.*) attachment to the Mount Wilson T. that increased the resolving power of the instrument several times and made it possible to measure directly the angular diameters of some of the stars, notably Betelgeuse.

In astrophysical research a spectrometer attachment replaces the ordinary eyepiece, while permanent records are obtained by means of a spectrograph attachment, whereby

is applied to the mode of reproduction of scenes enacted at some station *A* in a distant station *B* by means of 'land-line' or wireless communication between the two stations. T. became a practical problem following the discovery of the photo-electric effect (see PHOTO-ELECTRICITY), whereby variations in the intensity of light falling on a photo-electric cell are translated into corresponding variations in the electric current flowing through the cell. The first demonstration of T. took place in 1926, when J. L. Baird (*q.v.*) had made sufficient progress with his invention to justify its submission to members of the Royal Institution. Since that time Baird and other workers have brought about tremendous improvements in the technique of T. The general principles of transmission and reception are as follows.

(a) *Transmission*.—The figure shows a disc *D* containing a number of holes arranged in a spiral. This disc is rapidly revolved by means of an electric motor and light from the lamp *L* and mirror *M* traverses each part of the subject in turn. Photo-electric cells such as *C* therefore receive light of varying intensity from various parts of the subject, and the photo-electric currents generated are amplified and transmitted as electrical signals either by land-line or by wireless.

(b) *Reception*.—The signals received consist of fluctuating electric currents corresponding to the fluctuating light-signals falling on the photo-electric cells in the transmitting station. These signals are amplified and the amplified currents pass through a glowing neon lamp, causing corresponding fluctuations of the light emitted by the lamp. This light passes through apertures in a revolving disc, driven at exactly the same speed as the original disc, and falls on a screen. When the two discs are synchronised both as regards speed and phase, the image on the screen is identical with the subject in the transmitting station, though the image received may be enlarged by adjusting the distance between the disc and screen. Reception in natural colours is possible by means of a disc containing red, green and blue filters, while transmission may be arranged to utilise the photo-electric effect of the infra-red rays (*q.v.*), so that the subject is in complete darkness. The future possibilities of *T.*, therefore, cannot be overestimated. See Moseley and Chapple, *Television, To-day and To-morrow*, 1930.

Telford, Thomas (1757–1834), a Scottish civil engineer, b. at Westerkirk, Dumfriesshire, son of an Eskdale shepherd. Apprenticed to local stone-mason when 14 yrs. old. Went to Edinburgh 1780, then London, Portsmouth, 1784. Built Severn bridges at Montford and Buildwas, 1793–96. Ellesmere Canal 1796–1801. Caledonian Canal 1801–23 and in same period over 1000 m. of road and 1200 bridges throughout Scotland. His greatest achievement was the improvement of the London–Holyhead road with the building of the Menai suspension bridge. Did much harbour work in Scotland; St. Katherine Dock, London; Gotha Canal, Sweden; designed Warsaw–frontier road for Tsar Alexander. A man of talent, wholly self-educated, and often gave his services gratuitously. He was one of the founders of the Institute of Civil Engineers (1818). See his *Autobiography*, 1838. He is buried in Westminster Abbey.

Tell, see ALGERIA and TUNIS.

Tell, William, the hero of a Swiss legend, which first appears in a chronicle written between 1467 and 1476. The principal source, however, of the life and deeds of *T.* is the *Chronicon Helveticum* of Ægidius Tschudi (1505–72), from which Schiller took his drama *Wilhelm Tell* (1804). The story centres round the struggle for independence of the cantons Schwytz, Uri, and Unterwalden, and is as follows: *T.* having refused to do homage to the cap which Gessler, the Austrian governor, set up for that purpose in the market-place, was taken prisoner, and on being brought before the landgrave was promised his liberty if he could cleave an apple in twain, placed on his son's head, at the distance of eighty paces. He accomplished the task, but confessed on compulsion that the other arrow in his hand was meant for Gessler's heart had he failed, whereupon he was again seized and taken on the lake en route for Küssnacht Castle. But a storm having arisen, *T.* was asked to steer the ship, and while so doing effected his escape. He afterwards killed the landgrave, thus becoming the deliverer of his people. See Schiller's *Wilhelm Tell*, trans. by Albert Latham (Temple Classics).

Tell-el-Amarna, see TEL AL-AMARNA.

Tell-el-Kebir, a vil. in the N.E. of Egypt, situated on the Freshwater Canal. It owes its fame to the fact that it was the scene of Lord Wolseley's (then Sir Garnet) great victory over Arabi Pasha, Sept. 13, 1882.

Tellers of the Exchequer, see TALLY.

Telley, Gabriel, see TIRSO DE MOLINA.

Tellicherry, a tn. and seaport of British India in Madras Presidency and Malabar dist. It is situated between the Fr. settlement of Mahé and Cannamore, 38 m. N.N.W. of Calicut, and is protected by a natural rock breakwater. The exports are coffee, spices, coconuts, etc. Pop. 29,300.

Tellurium (*Te*, 127·6), a rare element of the sulphur group. It occurs in the free state in nature, but is chiefly obtained in combination with other elements, as in tellurite (TeO_2) and tetradymite (Bi_2Te_3). It is a bluish-white solid with a metallic lustre (melting-point 452°C .; sp. gr. 6·26). *T.* forms tellurides with hydrogen and the metals, corresponding to the sulphides. Two oxides, the dioxide and trioxide, are known, which give rise respectively to the two acids, tellurous acid and telluric acid.

Tellus, see GÆA.

Telpher, see MONORAIL.

Telshi, or **Telsial**, a tn. of Lithuania, in the prov. of Kovno and 178 m.

N.W. of the city of that name. Pop. 11,000.

Telugu, a language spoken in S. India. It belongs to the Dravidian group. The earliest known work in T. is a translation of the epic *Mahābhārata* (q.v.).

Tembuland, a div. of the Cape of Good Hope, S. Africa, situated near the coast to the S.W. of Griqualand East. Area 3339 sq. m. The name is derived from a Kaffir tribe, who claim to be descendants of Tembu. Pop.: coloured (1921) 230,361, European (1926) 4693.

Temenos (Gk. *τέμενος*, *τέμελειν*, to cut), the Gk. term in archaeology given to a piece of land marked off and consecrated to sacred uses; any sacred enclosure, as that surrounding or belonging to a temple.

Temesvar, or **Timisoara**, a royal free city in the co. of Timis, Rumania, stands on the Bega in the W. of the country. It is strongly fortified; is the see of a Rom. Catholic bishop and of a Gk. Orthodox bishop, with a fine cathedral and a castle. Pop. 72,223.

Tempe, a famous valley of N. Thessaly in Greece. It is situated between the mountains Pelion and Ossa, and through it runs the R. Peneus. It has become proverbial for beautiful scenery.

Tempera, or **Fresco Secco**, see **Fresco Painting and Mural Decoration**.

Temperament, the modification of exact acoustic intervals so as to make relative notes correspond in successive octaves. Such a device became necessary with the progress of harmonic writing, and in the early sixteenth century the Pythagorean third (ratio 81:54) was superseded by the major third in ratio 5:4. Further changes were made in adopting 'mean-tone' T. (seventeenth to eighteenth century), but although this gave six major and three minor keys with fairly pure intervals, the other keys were so bad that modulation was impossible. The best system was the equal T., dividing an octave into twelve exactly equal semitones. J. S. Bach insisted on this T. and proved its modulatory value by writing his books of Preludes and Fugues for Well-tempered Clavier through all keys. In equal T. the octave is the only pure interval, the fourth and fifth being least incorrect of the others.

Temperance. The universal recognition of the social, moral, and physical evils which may be directly or indirectly traced to the excessive consumption of alcohol is perhaps the most promising and significant tendency in the collective effort of modern society. The whole mental

attitude of civilised mankind has changed within the last century. Nor has the more critical attitude adopted been unaccompanied by the most widespread constructive endeavour towards the abatement of intemperance. However, it seems tolerably safe to assume: (1) that the non-drinking or teetotaler numbers of the population have steadily increased; (2) that the heaviest drinking occurs chiefly among (a) degenerates and loafers, and (b) those whom poverty, unemployment, and illness have driven to this strange asylum of forgetfulness, while the *per capita* consumption of absolute alcohol has fallen from 33 gallons annually to 19 gallons during the period from 1875 to 1929 with respect to beer, and from 27 gallons to 17 gallons with respect to spirits. There is a close relationship between intemperance on the one hand, and on the other pauperism, insanity, and crime; and during the nineteenth century various computations gave intemperance as the chief cause of the major social evils, some authorities placing the proportion as high as 75 per cent. But within recent years a more intelligent examination of records by skilled investigators yields a more moderate figure, especially as regards intemperance being a direct cause. After careful analysis, it has been found that intemperance was responsible only for 14 per cent. of cases of destitution, and the modern point of view among publicists may be expressed, in terms of psychology, that people drank because they were poor, not that they were poor because they drank. The percentage would, of course, be much greater if it were possible to compile statistics as to the indirect influence of intemperance upon, for example, young children reared in sordid home conditions with no moral training, and the additional handicap of malnutrition. According to the Lunacy Commissioners' tables, about 10 per cent. of cases of lunacy are directly attributable to excessive drinking. That alcoholism is responsible for crime is acknowledged, but it must be remembered that beyond the drunkenness, which in itself is a crime, there does not appear to be sufficient evidence to support the allegation that excessive drinking is the cause of major crimes other than suicide, since forgery, theft, and crimes of violence require good physical condition in the person of the perpetrator. In France, Lunier places the proportion of suicides due to alcoholism as one in eight, while in England the rate is higher, being one in five, according to Sullivan. So far as political measures for reform

are concerned it is to be noted that in England there is considerable justification for the widespread accusations levelled at the liquor trade and its vast wealth and resources. The pre-war value of the industry, including the manufacture and wholesale distribution of spirits, was £350,000,000, while at the present time it is nearly twice that figure. Vested interests on this scale are eloquent to explain why the 'trade' enlists its sympathies amongst a powerful section of the ruling community. The principal existing means adopted since the origination of the T. movement in 1826 may be conveniently classified into : (1) prohibition and local option, (2) the Scandinavian company system, which places the control of the sale of liquor in the municipality, the profits to be utilised for public purposes, (3) state monopoly or municipal control, (4) the institution of counter attractions, (5) high licence, (6) taxation of liquor. Prohibition (*q.v.*) has been adopted in the United States, and, as exemplified in that country, means the suppression of the buying and selling of liquor within the limits of the U.S.A. Thus stated, prohibition is clearly outside the scope of this article altogether, since it aims, or seems to aim, not at T. but at teetotalism. Eng. T. organisations have, with but few exceptions, never favoured prohibition, but are for the most part strongly in favour of local option (*see* LOCAL OPTION). Under the Scandinavian company system—called the Gothenburg system, from the fact that that town was the first large town to adopt it—the liquor traffic was controlled by companies to whom the municipal authorities transferred all liquor licences, such companies undertaking to carry on the trade solely for the good of the working classes and not to derive the slightest *private* profit from the traffic other than the ordinary rate of interest on the capital invested. If a manager failed to carry out the by-laws of a Bolag or Samlag (the Swedish and Norwegian name for such companies respectively) his dismissal could be promptly effected without the necessity of a costly trial. The concurrent features of this system were the establishment of eating-houses and reading-rooms in the Bolag or Samlag premises, the refusal to serve young persons with liquor, the reduction in the hours of sale, and the voluntary abandonment by the companies of a number of the licences handed over to them. In 1921 general prohibition was adopted in Norway as the result of a consultative plebiscite, but five years later the Act was repealed by a narrow

majority. At the present time the control of liquor is in the hands of the Vinmonopolet, a private chartered company under gov. guarantee, while only six of the Samlags are left. The charter expired in 1931. In Sweden in 1919 the Bratt system replaced the Gothenburg system, by a charter of the Stockholm City Council, and control rests in the hands of a central trade organisation subject to a Royal Board of Control. Finland, like the U.S.A., had an absolute prohibition law adopted in 1919. An advisory national plebiscite was held in January 1932, a great majority voting in favour of abolition of prohibition. The parliament thereupon set about passing a law permitting the sale of all liquors, but under a state-controlled monopoly. The system of state monopoly was adopted in Russia but during the War vodka was prohibited until the Soviet gov. restored its production to pre-war standard in 1922. It is accompanied by the abolition of on-consumption of spirits in the state drinking premises, and many other stringent provisions against public inducements to tipping, and it has also been effective in reducing intemperance in a country which was overrun with the evil. On the whole the most promising 'solution' of the drink problem lies in the direction of the municipal control of the drink traffic. Mr. Sherwell and Mr. Rowntree, supported by an imposing body of sympathisers, thus state their conclusions for the system of municipalisation : (1) that localities shall control the traffic either directly or through companies under the direct supervision of the central gov. and within statutory limits, (2) that the *whole* of the profits shall in the first instance be handed over to a central state authority, (3) that the only benefit which a locality shall receive from the profits shall be in the shape of an annual grant, in ratio to population and not profits earned, from the state authority for the establishment of recreative centres, (4) that the right of prohibition shall be given to every local authority, which, if exercised, shall not debar such authority from the annual grant above alluded to, and (5) that the co-operation of influential citizens, outside the local governing body, shall be invited in the work of local management.

Consult Rowntree and Sherwell, *The Temperance Problem and Social Reform*, 1901; Vernon, *The Alcohol Problem*, 1928; Carver, *Government Control of the Liquor Business*, 1919; Fisher and Brougham, *The Noble Experiment* (Alcohol Information Committee), 1930; Tydings, *Before*

and after *Prohibition*, 1930; Catlin, *Liquor Control*, 1931; *Anti-Saloon Year Book*; *The Brewers' Almanack*.

Temperature, in physics, is the condition of a body on which its power of transferring or receiving heat from another body depends. The sensation of touch gives no accurate knowledge as to whether one body is hotter than another. To obtain this one of the other effects which heat produces on matter is employed. The effect generally made use of is, that most substances, when heated, change in size, and in gases the change is proportional to the T. over a very large range. The liquid mercury is, however, generally adopted, its expansion being nearly proportional to the T.; thus most thermometers contain this liquid, the T. being indicated by the measurement of the volume of mercury contained. Alcohol is used for the measurement of low Ts. owing to its low freezing-point, but is of little use for high Ts. owing to its low boiling-point. The most accurate thermometer is the gas thermometer. The change of state of substances is also used for indicating T., the unit of T. being obtained from the range of T. between the melting-point of ice and the boiling-point of water at 760 mm. pressure, the range being divided into 100 equal parts on the Centigrade thermometer and 180 on the Fahrenheit. The variation of the resistance of a wire to an electric current, which occurs with a change of T., is also utilised for the measurement of T. These electrical thermometers are made to yield very accurate results. For absolute T., see THERMODYNAMICS; GAS AND GASES; PYROMETER; and THERMOMETER.

Tempering, a process by which steel is brought to any required degree of hardness, toughness, and elasticity. The process consists of heating the steel to a high temperature and cooling it by immersion in water.

Tempest, Marie Susan, Eng. actress; b. July 15, 1864, in London; eldest daughter of Edwin Etherington. Married Cosmo Charles Gordon-Lennox (d. 1921); then W. Graham Browne. Educated: Convent des Ursulines, Thildonck, Belgium. First famous on Eng. stage in musical comedy such as *The Geisha*, 1896; turned to speaking-comedy, has had a long career in many varied parts. Toured the world, 1914-22.

Tempio, or **Tempio Pausania**, a tn. of Sardinia in the prov. of Sassari. Pop. 14,000.

Templars, or **Knights Templars**, the most famous and most powerful of the great military orders of the Middle Ages. They are known also as the

Brethren of the Temple at Jerusalem, the Soldiery of the Temple, or the Soldiers of Christ. The military orders were three in number, and all owed their origin to the burst of crusading zeal which marked the eleventh and twelfth centuries. Besides the T., we have also the Knights of the Hospital of St. John of Jerusalem (commonly called the Knights Hospitallers) and the Teutonic Knights of St. Mary of Jerusalem or Ger. Knights of the Cross. The Order of the Templars was founded in 1118 or 1119 by nine Fr. knights, then fighting in the Holy Land. Their original vow was simply to maintain free passage for the pilgrims who should visit the Holy Land. The name that they first took was the Poor Soldiers (*Pauperes Commilitones*) of the Holy City, and they professed to have no source of subsistence but the alms of the faithful. The king of Jerusalem, Baldwin II., gave them their first place of residence, a part of his palace; to which the abbot and canons of the church and convent of the Temple, which stood adjoining, added another building for keeping their arms. From this last they obtained the name of T. The militant rule of the T. attracted general attention, and so favourably was it regarded that in 1120 the Hospitallers obtained from Pope Calixtus II. a new rule on a similar plan. The T. were first regularly formed into an order under the next pope, Honorius II., who confirmed their rule, which was that of St. Benedict, and assigned a white mantle as their badge, to distinguish them from the Hospitallers, who wore a black mantle with a white cross. In imitation of this white cross, Pope Eugenius added a red cross on the left breast to the mantle of the T. The T.'s standard, *Beauseant* (O. Fr., a black and white horse), was a red cross on a field striped black and white, and *Beauseant* was the famous war-cry of the order. The order spread rapidly throughout Europe; legacies and donations in lands and money were showered upon it by persons of all ranks; members of the noblest families in every nation of Christendom eagerly sought to be joined to it. The rapid increase in power and wealth was injurious. Of the three vows of poverty, chastity, and obedience, the first two were disregarded. The constitution of the Knights Templars was simple. At the head was the grand master, who was not only elected by the chapter or general body of the knights, but was also very much controlled by it. Under the grand master was his seneschal or lieutenant, and other high officers were the marshal,

the treasurer, etc. The several countries in Asia and Europe in which the order had possessions were denominated provinces, and each of them was presided over by a resident chief, called indifferently a grand prior, grand preceptor, or provincial master. Under the provincial masters were the priors, otherwise called bailiffs or masters, who each had charge of one of the districts into which the province was divided; and finally, under the priors were the preceptors, each of whom presided over a single house or establishment, hence called a preceptory. The head province was that of Jerusalem, and here the grand master resided till 1187. After this he retired to Acre, and then to Limisso. The history of the Knights Templars would embrace the history of the wars of the Christians against the Infidels in the East for all the time they lasted after the establishment of the order. For more than 170 years the Soldiers of the Temple formed the most renowned portion of the Christian troops, and almost every encounter with the enemy bore witness to their prowess and daring. The destroyer of the T. was Philip le Bel of France, who had long been their foe. He compelled the pope to summon the grand master, Jacques de Molay, to Europe. In 1307, whilst Molay was at Paris, two individuals of notoriously evil character lying in prison made certain revelations accusing the T. of heresy, idolatry, unbelief, and a number of foul practices. On Sept. 12, sealed letters were sent throughout France, to be opened on an appointed day, and then all the T. in France were seized simultaneously. By torture and other means more revelations were secured, and Philip managed to persuade the other European princes to join with him against the Templars. By 1320 the order was at an end, except in Portugal, where it merely took the new name of the Order of Christ. In the U.S.A. the masons have a uniformed body known as Knights Templars who hold a conclave every three years. There is great competition among American cities to secure this meeting, because of the brilliant parades and of the great crowds of visitors they draw. Consult Pertz, *Hist. Pontific*; Michelet, *Procès* (Bk. i. on the trial and torture of Templars in 1307-08); E. S. King, *The Knights Hospitallers in the Holy Land*, 1931.

Temple, a city of Texas, U.S.A., in Bell co., situated in a cotton-growing district, 35 m. S.S.W. of Waco. It was founded in 1881, and chartered as a city in 1884. Pop. (1930) 15,345.

Temple, see INNS OF COURT.

Temple, Frederick (1821-1902), Eng. archbishop, educated at Balliol College, Oxford, where he met and formed a friendship with Jowett, Matthew Arnold, and Clough. Temple was ordained deacon in 1846, and priest in 1847. Scholastic labour now seemed to be his mission, although he undertook some gov. work in London before becoming headmaster of Rugby. His friendship with Gladstone, whose Liberal views he shared, led to his being appointed to the see of Exeter, where he won for himself great popularity by his sincerity and manfulness. He was directed to the bishopric of London in 1885, and in 1896 he was nominated Archbishop of Canterbury. Among the ideals which Dr. Temple had much at heart was the cause of temperance. He was very interested in education. He d. at Lambeth Palace, Dec. 22. See Life by E. G. Sandford.



SIR WILLIAM TEMPLE

Temple, Henry John, see PALMERSTON.

Temple, Richard Grenville, Earl (1711-79), the brother of George Grenville, the premier who succeeded Bute in 1761. He was the brother-in-law of the elder Pitt, and held office under him during the years 1758-61. He was a bitter and consistent opponent of Bute, but supported his brother's Stamp Act against the probably wiser views of Chatham.

Temple, Sir William, Bart. (1628-99), a statesman and man of letters, travelled in his youth, and in 1655

married Dorothy Osborne. He settled at Sheen in 1663. Three years later he was created baronet, and appointed envoy at Brussels. He was largely responsible for carrying through the triple alliance formed against Spain in 1668 between England, Holland, and Sweden. He was later ambassador at The Hague, but was recalled in 1670. Four years after he returned to The Hague to arrange a marriage between Princess Mary of England and William of Orange. He was offered a secretaryship of state in 1677 and 1679, but declined. When he removed to Moor Park he engaged Swift as his secretary, and was assisted by him in the composition of his *Memoirs*. His *Miscellanea* were pub. in 1880 and a second series in 1790. There is a biography by Courtenay (1836), reviewed by Macaulay in the *Edinburgh Review*.

Temple, William, Eng. archbishop; b. Oct. 15, 1881, at the Palace, Exeter; son of Bishop Frederick T., afterwards Archbishop of Canterbury. Educated: Rugby; Balliol College, Oxford. Fellow and lecturer in philosophy, Queen's College, Oxford, 1904-10. Deacon, 1908; priest, 1909. Chaplain to Archbishop of Canterbury, 1910-21. Headmaster, Repton School, 1910-14. Rector, St. James's, Piccadilly, 1914-18. Canon of Westminster, 1919-21. Bishop of Manchester, 1921-29. Appointed Archbishop of York and P.C., 1929.

Temple, The. The Heb. word *hēkāl* is translated in the O.T. sometimes as 'temple,' and sometimes as 'palace.' The idea of the royal residence is, of course, common in these cases. Sometimes, as in Ezek. xli. 1, and 1 Kings vi. 17, it denotes only the fore part of the building, the Holy Place as distinguished from the Holy of Holies. Three great temples were erected to Jehovah during the history of the children of Israel. (1) *Solomon's Temple*. This was erected by Solomon in conjunction with his own palace to the N. of Jerusalem on Mt. Sion. According to 1 Chron. xxviii. 11-19, the exact plan of the building was drawn by David, guided by the hand of the Lord. In front was a porch, 20 cubits in length and 10 in breadth. The entrance was supported by two brass pillars, and was probably lower than the main body of the Temple; 2 Chron. iii. 4 gives its height as 120 cubits, which should, perhaps, be reduced to 20. This led into the fore part of the building, 20 cubits by 40, and this again to the hindmost chamber, 20 cubits by 20. With the exception of the porch, the house was surrounded by an annex of side chambers in three stories, each 5 cubits in height. The number of these side rooms, in which

were placed the stores and treasures of the sanctuary, is unknown. The Temple building was surrounded by the inner court (1 Kings vi. 36, vii. 12), as distinguished from the outer or great court, which belonged to the royal residence. The Temple of Solomon was burnt by the command of Nebuchadnezzar on the 9th or 10th day of the fifth month of his nineteenth year, 588 B.C. (2) *The Temple of Zerubbabel*. The building of the post-exilic Temple was commenced in 536 B.C., but was soon interrupted (Ezra iii. 8). The sanctuary was, in fact, restored under Darius, 520-516 B.C. An edict of Cyrus (Ezek. vi. 3 ff.) gives the height of the Temple as 60 cubits, the breadth being the same. From the year 168 to 165 B.C. the Temple was turned into a heathen sanctuary, but at the close of this short period was restored to its original use. (3) *The Temple of Herod* was a magnificent restoration of the former Temple, and this last period is by far the most brilliant in the Temple history. The forty-six years over which the work was extended and the magnificent proportions of the finished work are referred to in the N.T.

Temple Bar was a famous gateway of London dividing Fleet Street from the Strand. When the sovereign visited the City, the custom was to ask the permission of the Lord Mayor to pass T. B. The old archway was built by Wren in 1670, but was removed in 1878 and was re-erected in Theobalds Park, Cheshunt, Herts. It is now represented by a monument called the Temple Bar Memorial.

Temporal Power, see PAPACY.

'Temps, Le,' one of the leading Fr. dailies, founded in 1861 by Fr. Nefftzer, a publicist of pronounced neo-Hegelian views, mainly with the object of furthering the interests of international trade. It was the pioneer in Fr. journalism of the system of employing a good staff of foreign correspondents. Though literature and critiques have a place, the paper is essentially a political organ and has always been characterised by its Liberal opinions, albeit expressed in a restrained yet sound and philosophical manner. Nefftzer abandoned the direction of the *T.* in 1872, though he continued to collaborate with his successor. Among its most notable contributors have been Scherer (religious discussion and literary criticisms); Sainte-Beuve (literary causerie); and Brisson and Blanc (publicist articles). It favours a republican form of gov., and invariably condemns jingoism.

Ten, Council of, a secret committee of the Venetian Senate, established in 1310 and vested with such a measure

of executive authority as was deemed effective to cope with extraordinary crises. Its institution marked the final overthrow of the pre-existing democratic constitution, acting through a Great Council of all the citizens under a supreme magistrate, the Doge, in favour of a system of close oligarchies of hereditary aristocrats. After the defeat of Tiepolo's revolution (1310) against the growing exclusion of so many Venetians from any share in the gov., the aristocratic element deemed it advisable that the Great Council, then composed almost entirely of the nobility (*q.v.*), should elect ten of its members, the Doge, his council, and the Supreme Court another ten, and that from these the Great Council should make a final selection of ten to act as a committee of public safety. When the Great Council finally became a mere electoral body and the legislative and judicial powers of the Senate were overshadowed by the C. of T., that body, though theoretically outside the constitution, became inferior in authority only to the collegio or ministers, the six ducal councillors immediately in touch with the Doge, and the Doge himself. Its numbers varied from time to time from ten to seventeen, and it was not finally abolished until 1797, the date of the fall of the republic.

Tenacity, *see* ELASTICITY, and STRENGTH OF MATERIALS.

Tenant, *see* LANDLORD AND TENANT.
Tenants in Common, *see* COMMON, TENANCY IN.

Tenasserim : (1) A tn. of Lower Burma on the T. riv. (2) A div. of Lower Burma, consisting of a narrow strip of land lying to the E. of the Bay of Bengal. There is a heavy rainfall, and where cultivation is possible, rice is grown. Cap. Moulmein. Area 35,886 sq. m. Pop. 1,429,000.

Ten Brink Bernard, *see* BRINK, BERNARD TEN.

Ten Brink, Jan, *see* BRINK, JAN TEN.

Tenby, a municipal bor. and seaport of Pembrokeshire, Wales, 9 m. E. of Pembroke. It is an interesting old tn. and a much-frequented watering-place. Pop. (1931) 4108.

Tench (*Tinea vulgaris*), a common freshwater fish characterised by exceedingly small scales, abundant secretion of mucus, and the presence of a short barbule at each angle of the mouth. It is rich olive green in colour, shading into light grey on the belly. It spawns in early summer, the greenish ova numbering about 250,000. Like the carp, to whose family it belongs, it feeds on both animal and vegetable substances, and if fattened in a clean stew-pond makes good eating.

Tender, in law, means an offer of money in payment of a debt. To be valid it must be: (1) unconditional. Hence if the debtor tenders money only on condition of getting a stamped receipt, or if he tenders too large an amount and demands change, the T. is bad. But a T. will not be invalid merely because it is made under protest. (2) Of the whole debt; though if the creditor's claim is made up of separate items the debtor may validly make a T. of payment of any one item provided he makes it clear in respect of which item it is made. (3) In the current coin of the realm. The T. of Bank of England Notes is legal in England and Wales for every purpose, and by anyone (except by the Bank of England). No one can be compelled to give change (*see supra*). Gold, if above the least current weight, and Treasury notes are legal T. to any amount. Silver is legal T. for sums up to 40s., copper (or bronze) up to 12d.; but farthings only up to 6d. Though a bearer banknote is good T. for all sums over £5, a T. in country notes or by cheque is good if the creditor refuses to accept merely on the ground that the debt is larger than the amount for which the notes or cheque are made out. A valid T. does not extinguish the debt, but it exposes the creditor in his action against the debtor as the litigious oppressor, and a plea of T., if sustained by the debtor, will assuredly result in the plaintiff having to pay the costs of the action. But the defendant, if he pleads T., must pay the amount into court. The other effects of T. are that it stops the further accrual of interest, and extinguishes any right of lien (*q.v.*) the creditor may have. T. in commerce is a written offer of terms for executing a specific piece of work or for supplying a certain consignment of merchandise.

Tendon, a band or cord of white tissue which connects a muscle with the bone. The fibres of which Ts. are composed are arranged parallel to each other in the direction of the stress, and form a dense compact structure of great strength and flexibility. The T. is attached at one end to the muscle and at the other to the periosteum of the bone, with which it is so intimately commingled that the rupture of a T. at its junction with the bone is often accompanied by the detachment of a fragment of bone. In their course Ts. often pass round bony projections in the manner of a pulley, and in some cases sesamoid bones are developed.

Tendon of Achilles attaches the muscles of the calf of the leg to the heel-bone. It is capable of resisting a great tensional strain, and yet is

sometimes ruptured by the contraction of the muscles in sudden extension of the foot. Anct. surgeons regarded wounds in this tendon as fatal. It was so called from the hero Achilles, whose mother dipped him when an infant into the Styx, so that he became invulnerable except in the heel by which she held him.

Tenedos, a Turkish island in the Ægean Sea, near the entrance of the Dardanelles. It was occupied by Greece during the Great War. Its chief export is wine. Area 16 sq. m. Pop. 4000.

Tenerife, or **Teneriffe**, Peak of, the highest mountain in the Canary Is. It is also known as the Pico de Teyde, and has an elevation of 12,180 ft. There are really two peaks to this mountain mass, which is a dormant volcano, the other being Pico Chahorra, with an elevation of 9880 ft. There has not been an eruption since 1798, but there was volcanic disturbance in the neighbourhood as recently as 1909. The peak has snow on its slopes all the year round. It is 11 m. from Orotava at the base to the summit.

Tengri Khan, see KHAN-TENGRI.

Teng-Yuah-ting, see MOMOIN.

Teniers, David, the Elder (1582-1649), a Flemish painter, *b.* at Antwerp. He studied painting under Rubens and Adam Elshelmer at Rome. His subjects were familiar scenes of ordinary Flemish life. Three paintings are in the Nat. Gallery, London.

Teniers, David, the Younger (1610-94), a Flemish painter, the son of David T., the Elder, from whom he received his principal instruction. He was a master in the Antwerp Guild (1632-33). He was appointed court painter to Archduke Leopold and keeper of his pictures. T. painted pictures for him, many of which are now in the former Imperial Gallery, Vienna, and at Munich; and he also copied other masters for him, and some of these copies are in the Wallace Collection, London. Many of his works are also in the National Gallery.

Tenison, Thomas (1636-1715), Archbishop of Canterbury, *b.* at Cottenham in Cambridgeshire, and educated at the Grammar School, Norwich, and at Corpus Christi College, Cambridge. He was made minister of St. Andrew's, Cambridge, and rector of Holywell in Huntingdonshire; and in 1680 was presented to the living of St. Martin-in-the-Fields, London. In 1689 he was made Archdeacon of London, in 1691 Bishop of Lincoln, and in 1694 Archbishop of Canterbury. In St. Martin-in-the-Fields he endowed a free school and founded a library.

Ten Jurisdictions, **The League of**, the name applied to the league formed on the death of Frederick, Count of Toggenburg (1436). It was the last of the three great leagues formed by the Swiss.

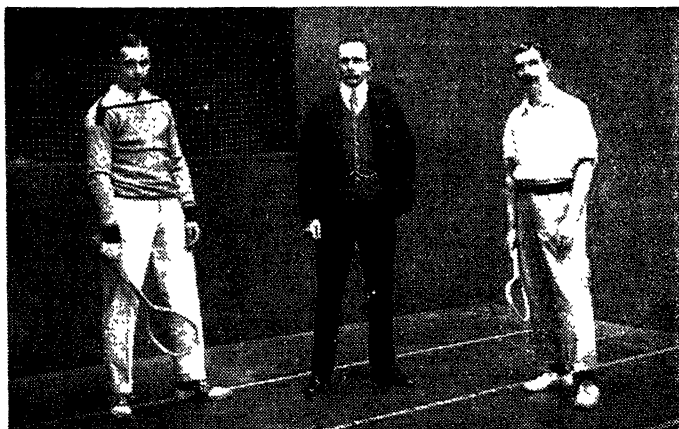
Tennessee, a central southern state of N. America, having an area of 42,022 sq. m. Its boundaries on the N. are Kentucky and Virginia; on the E., N. Carolina; on the S., Georgia, Alabama, and Mississippi; and the Mississippi R. on the W. separates it from Arkansas and Missouri. Along the eastern boundaries rise the Unaka and Great Smoky Mts., with peaks over 6000 ft. high, whilst between these highlands and the Cumberland Plateau, the mean elevation of which is 2000 ft., is the valley of E. Tennessee (watered by the upper reaches of the Tennessee R. and its tributaries) which is part of the Great Valley of the Alleghanies. The Cumberland R., an affluent of the Ohio, waters a fertile valley W. of the Cumberland Mts. in the N. of the state. There are wide level tracts in the W. between the Mississippi and the lower Tennessee. The state enjoys a very pleasant climate, the average annual fall of snow being 8 in. and of rain 52 in. The mean extremes of temperature are 38° F. in the winter and 78° in the summer. Over a half is still woodland, and lumbering and timbering bring in a large revenue; national forest lands cover some 366,400 acs. Cultivated lands are dispersed over the rest, the best crop being maize (73,600,000 bushels in 1929), though conditions are quite favourable to the growth of wheat, oats, potatoes, and peanuts. Cotton, hay, sweet potatoes, pease, sorghum, tobacco, and fruits, especially strawberries, are also cultivated. Stock-raising is declining. The fields of bituminous coal cover an area of 4400 sq. m., and iron, copper, clay, zinc, gold, and silver bring in rapidly increasing incomes. There are flour and grist mills, saw mills and foundries, blast furnaces, textile factories, and tobacco, cotton seed, oil and cake, and leather are prepared. Nashville is the cap. (pop. 153,866), but the largest city is Memphis (253,143), whilst Chattanooga (119,798) and Knoxville (105,802) are also important. T. is well supplied with railways, and in the Mississippi and the Tennessee rivers has excellent natural waterways. Education is compulsory and there are 26 universities, the state one being at Knoxville. T. had its first settlement at Watauga led by James Robertson in 1769; admitted to Union, 1796; seceded, 1861; readmitted, 1866. Its General Assembly consists of a Senate of

thirty-three members and a House of Representatives of ninety-nine members; it is represented in Congress by two senators and ten representatives. Pop. (1930) 2,616,556. See T. Karns, *Civil Government in Tennessee*.

Tennessee River is the largest (950 m. long) tributary of the Ohio, U.S.A. The Holston and Clinch, which unite near Knoxville, Virginia, are the headstreams. The T. winds with a devious course through E. Tennessee, Alabama, W. Tennessee, and Kentucky, and finally reaches the Ohio at Paducah. It is navigable from the mouth to the Mussel Shoal Rapids, and from Knoxville to a gorge some 500 m. up, known as the Suck.

his first cartoon was 'Lord Jack the Giant-Killer,' representing Lord John Russell attacking Cardinal Wiseman. Some 2300 cartoons and many smaller drawings were executed by T. before he severed his connection with *Punch* in Jan. 1901. In them can be traced a political history of the period. His drawing and the originality of his conceptions coupled with his sense of humour make him unrivalled as a cartoonist. His illustrations to Lewis Carroll's *Alice in Wonderland* and *Through the Looking-Glass* have delighted children of all ages. He was knighted in 1893.

Tennis, one of the oldest ball-games in existence, is often called



[By courtesy of Eustace Miles, Esq., and with acknowledgments to T. S. Tailor

THREE TENNIS CHAMPIONS: JAY GOULD, EUSTACE MILES, PETER LATHAM

Tenniel, Sir John (1820-1914), an Eng. cartoonist and caricaturist, b. in London. He is especially famous in connection with *Punch*, with which he was associated for many years. He studied for a short time at the Royal Academy, and his first picture appeared at the exhibition of the Society of British Artists in 1836. His design for a mural decoration of the new palace of Westminster in 1845 resulted in his being commissioned to paint a fresco in the House of Lords. Meantime his reputation as a humorous artist had grown, and in 1850 Mark Lemon invited him to succeed Richard Doyle as joint cartoonist with John Leech in *Punch*, his illustrations to *Aesop's Fables* having attracted much attention. His first drawing appeared in the initial letter on p. 224, vol. xix., and

royal T. or court T. to distinguish it from lawn T. It was played by the kings and aristocracy of France and England before the fourteenth century, and at one time became so popular in England that laws were passed prohibiting it. These were revoked by Henry VII., who played at Windsor Castle, while his son built a court at Hampton Court Palace. At the present day it has lost much of its former popularity owing to the expense of erecting and keeping up a court. Edward VII., when Prince of Wales, used to play at Prince's. Other courts are at Queen's, Lord's, Marylebone, Brighton, Oxford, and Cambridge. In 1899 the Queen's Club Championship was thrown open to all amateurs. Champions since 1892 are H. E. Crawley (1892-94), Sir Edward Grey (1895-96, 1898),

E. H. Miles (1899-1903, 1905-06, 1909-10), Jay Gould (1907-08), Hon. N. B. Lytton (1911-12), E. M. Baerlein (1912), Hon. N. S. Lytton (1913), E. M. Baerlein (1914, 1919-29). Among American champions are Jay Gould, L. M. Stockton, C. S. Cutting, and W. C. Wright. The courts vary slightly in dimensions, the actual floor measuring 96 ft. by 31 ft. 8 in. Round the two ends and one of the side walls run the dedans and corridor, a covered passage with a sloping wooden roof called the penthouse. Across the middle of the court is stretched a net 5 ft. high at the sides, 3 ft. in the centre. The roof of the penthouse is 7 ft. wide, and is 7 ft. 1½ in. high at the side of the court and 10 ft. 7 in. at the further edge. The balls weigh 2½ oz. and are 2½ in. in diameter. The length of the racket is 2 ft. 2 in. and its weight about 16 oz. The game may be played by two or four players, and the method of scoring is the same as that used in lawn T. The winner of the toss takes the service and plays from any part of his court, striking the ball so that it goes over the net and bounces from the side penthouse into the service-court. The striker-out should then return the ball over the net at volley or after one bounce without striking the play-line or touching the roof. If a player fails to return a ball a 'chase' is made; the marker calls out 'chase four,' 'better than three,' 'second gallery,' according to the spot on which the ball falls, the court being marked off in chases, and strokes into galleries and doors also counting as chases. If the second player afterwards makes a better chase than the first, he wins the chase, but if he makes the same chase it is 'chase off,' and the score is unaffected. The winning of a chase counts one point. When two chases have been made, or one, if either player is within one stroke of a game, the players change sides. A set is the best of eleven games. Strokes are also scored by hitting the ball into the winning hazard, viz. the last gallery on the hazard side into the grille or dedans. Consult Heathcote, *Tennis, Lawn Tennis, Rackets, Fives*, 1903; Marshall and Tait, *Tennis, Rackets, and Fives*, 1890; and Eustace Miles, *Racquets, Tennis, and Squash*, 1902.

Tennis, Lawn, see LAWN TENNIS.

Tennyson, Alfred, first Baron (1809-92), Eng. poet, the fourth son of the Rev. Dr. George Clayton T., rector of Somersby, Lincolnshire, and a younger brother of Charles T. (afterwards Turner) and Frederick T. He was b. at Somersby on Aug. 6, and in 1827 he and his brother Charles pub-

lished a little volume, entitled *Poems by Two Brothers*, to which Frederick had contributed four pieces. Early in the following year he and Charles went to Trinity College, Cambridge, and there joined the famous set that included Spedding, Merivale, Monckton Milnes, Brookfield, Kemble, Arthur Hallam, Buller, and later, Thackeray. He competed for, and won, the Chancellor's Medal for Eng. verse in 1829, when the unpromising theme was *Timbuctoo*, and next year brought out a volume of *Poems, chiefly Lyrical* that contained some charming verses, which were favourably reviewed by Leigh Hunt and others. In 1833 appeared the slim volume of poems which included *The Lady of Shalott*, *The Lotus Eaters*, and *A Dream of Fair Women*. These, though unfavourably reviewed by the *Quarterly*, found some appreciation at the hands of the public, and T.'s work began to be known to and admired by a small circle. It was not until 1842 that T. brought out another collection of poems, which contained the cream of his earlier work, and in addition many new pieces. T.'s financial position was at this time unsound, and to make his mind easier, his friends contrived to induce Sir Robert Peel in 1845 to grant him a civil list pension of £200 a year. *The Princess* (1847) was T.'s first popular success, and this ran through five editions in six years. The favour with which this poem was received was, however, as nothing compared to the chorus of praise which greeted the appearance of *In Memoriam*, which was published anonymously in 1850. It was on the strength of the profits of this volume that T. brought his long engagement with Emily Sellwood to an end by marrying her on June 13, 1850. The marriage was in every way successful, and the poet used in later life to say: 'The peace of God came into my life when I married her.' In April Wordsworth d., and the office of poet-laureate was offered to Samuel Rogers, who, though he would have welcomed the offer earlier, thought that at eighty-seven he was too old to hold it. The honour was then offered to, and accepted by, T. Shortly after T. acquired a house, Farringford, near Freshwater Bay, in the Isle of Wight, which was his home for many years. *The Ode on the Death of the Duke of Wellington* appeared in 1852, and T. published nothing for three years, when came the popular and rousing verses, *The Charge of the Light Brigade*. This was followed by *Maud, and other Poems* (1855), *Idylls of the King* (1859), *The Holy Grail* (1869), *Locksley Hall* (1886), and *Demeter, and other Poems*

(1889), which volume contained *Crossing the Bar*. His first play, *Queen Mary*, was published in 1875, and *Harold* two years later. *Becket* was printed in 1884, and nine years later was produced on the stage at the Lyceum Theatre by Sir Henry Irving, in whose repertoire henceforth it was a valuable item. T., whose health had never been robust, *d.* on Oct. 6. T.'s place in Eng. literature is assured, although, perhaps, the time has not yet arrived when it is possible definitely to say exactly where it is. He had a great lyrical gift, and his best work was done in that strain. The wider public, however, has not a very keen perception of the beauty of lyrics, and by it T. is loved for *In Memoriam*, *Idylls of the King*, and for such pieces as *The Charge of the Light Brigade*. It is for the music of the verse that his work will survive. There are biographies by his son Hallam (1897), R. F. Horton, and Morton Luce (*Temple Primmers*); and numerous studies of his works, notably by Stopford Brooke (1894), Churton Collins (1891), Hallam, Lord Tennyson (1913), and H. Nicholson (1925), have been published. *Unpublished Early Poems by Alfred Tennyson*, edited by Charles Tennyson, his grandson, 1931.

Tenor, see JOINERY.

Tenor: (1) The highest male voice, the compass being from tenor C to treble A, *i.e.*, an octave below soprano. It is so called because in the old plain song the tenor part was of sustained notes around which the harmonies were set. (2) The viola. (3) The leading bell in a peal.

Tenrec, or Tailless Hedgehog, see CENTETES.

Tent, a shelter made of flexible material, usually canvas, which is supported on a pole and stretched by means of cords fastened to pegs in the ground. Ts. form the chief covering for troops undergoing practical training, but owing to their weight and the fact that they hamper an army in the field, are held in disfavour nowadays by military authorities. The modern tendency to camp out in the open has also increased the vogue of the T. Marquees are large canvas-covered shelters which are supported on the principle of the T., but which are very much larger. A kind of marquee T. used as a hospital T. in the army nowadays is capable of holding eighteen beds. The circular T. is used in the British army. In the infantry one T. is assigned to every fifteen non-commissioned officers and men, and in the cavalry to every twelve. Special accommodation is made for the officers. The Ts. are

10 ft. high and have a diameter of 12½ ft.

Tenterden, an urban dist. and market tn. of Kent, England, 15 m. S.S.E. of Maidstone. Its church once formed part of an Augustinian monastery, and is crowned by a lofty tower. Pop. (1931) 3473.

Tenterden, Charles Abbott, first Baron (1762-1832), *b.* at Canterbury. His father was a barber, and sent him to King's School at Canterbury. He studied the law and was admitted to the Bar, and became a special pleader. He was made Recorder of Oxford in 1801, and the following year published his treatise *Law relative to Merchant Ships and Seamen*. In 1816, he was puisne judge in Court of Common Pleas and two years later was appointed Chief Justice. He was created Baron T. of Henden in 1827. He is buried in the Foundling Hospital, London. His treatise mentioned above is still an authority in mercantile law.

Tenthredo, see SAW FLIES.

Tenths: (1) The tenth part of the annual profit of an ecclesiastical living which formerly went to the pope, but at the Reformation was transferred to the crown. Afterwards various benefices were exempted from payment of T. altogether (see QUEEN ANNE'S BOUNTY and TITHE). (2) In music, the octave of the third; an interval comprehending nine conjoint degrees, or ten sounds, diatonically divided.

Tenure, Land. Tenure is defined by the classic Williams as the relation between feudal lord and tenant of land (*Real Property*). This is sufficiently accurate because the feudal system is the foundation of modern Eng. real property law, although the fabric of that system was effectually shattered in the early part of the seventeenth century. Many of the incidents of the feudal system existed in England prior to the Conquest, but the theory that all land was held mediately or immediately of the sovereign in return for either free or base services was essentially a Norman innovation adapted by the Conqueror from Continental feudal institutions. The only competing system of T. was the 'mark system' (which existed before the Saxon invasion), under which pasture and waste lands were held in common ownership by tribal heads of families and the arable land of the tribe annually allotted for cultivation. This system, says Stubbs, soon gave way to one of absolute ownership (*allod*), and in any event it would have collapsed at the Conquest, though there were for long consequences of

its existence in the shape of (1) communal pasture land (Fielden mentions Port Meadow at Oxford) and (2) townships. Apparently a few old boroughs are a pure development of the mark system, and though most townships became Norman manors, it would in many modern cases be difficult to establish any royal overlordship. In return for his loan of land the feudal tenant was bound to perform either *free* or *base* services. From these services were developed respectively freehold T., and copyhold through T. in villeinage. Of freehold Ts. the most honourable was that of knight service (early commuted for *scutage* or shield-money), the various incidents of which (fealty, aids, reliefs, wardship, marriage, primer seisin) were, however, attached to *socage* T., the T. which historically is commonly opposed to it. Most of the anct. feudal incidents were abolished by the Statute of Tenures, 1660 (12 Car. II. c. 24), which assimilated knight service to 'free and common socage.' The only incidents surviving are escheat, a small quit-rent, and a relief in the form of one year's rent on succession to a deceased tenant. There were also various exceptional forms of the above two cardinal divisions of T., some of which probably existed long before the Conquest. They were: (1) grand serjeanty (*q.v.*); (2) cornage (Lat. *cornu*, a horn), *i.e.* T. on condition of winding a horn to give warning of a hostile incursion by the Scots (these two were species of knight service, and the Dukes of Norfolk, Marlborough, and Wellington still hold lands by T. of grand serjeanty); (3) petit serjeanty (T. directly of the crown by the service of giving some martial necessary in time of war); (4) burgage T. (*q.v.*) consisting now of anct. borough freeholds; (5) gavelkind (*q.v.*). These are all species of free socage T. In addition to all these, there was the eleemosynary or spiritual T. of frank-almoigne (free alms), by which religious houses held on various indeterminate conditions of spiritual services, *e.g.*, praying for the soul of the donor. Villein or base T. did not primarily constitute T. at all, as the 'tenant' had no common law estate and was a mere farming licensee. Later, when his uncertain and servile labours became commuted for a money rent, his T. developed into copyhold land (*i.e.*, land held by *copy* of manorial court roll). All copyholds must be part of some manor, and hence none can have come into existence after the Statute of Quia Emptores, 1293 (*q.v.*). Manorial lands in England comprise besides copyhold land (1) manorial

freehold estates in fee simple, usually held subject to quit rents, heriots (*q.v.*), or on other more or less archaic conditions; (2) customary 'freeholds' or copyhold tenure by the custom of anct. demesne, reputed to be anct. patrimonial possessions of the crown (going back to the time of Edward the Confessor according to Domesday Book) which were kept in the king's own hands to provide a revenue for maintaining the royal dignity. *See also* DE DONIS, ENTAIL, ESCHEAT, ESTATE, FORFEITURE, LAND, LAND LAWS, and LANDLORD AND TENANT.

Tepec: (1) A ter. of Mexico. Produces sugar, cotton, tobacco, maize, etc., in the lower regions. Area, 11,275 sq. m. Pop. 175,750. (2) The cap. of the state of Nayarit, Mexico, a prosperous tn. with a healthy climate, the seat of a Catholic bishop. Manufs cotton-stuffs, cloth, and cigars. Pop. 16,778.

Teplitz, Teplice-Sanoy, or Teplitz-Shönau, a tn. and watering-place of Bohemia, Czechoslovakia, 80 m. N.N.W. of Prague. Manufs. machinery, metal goods, chemicals, hardware, cotton, lace, furniture, etc. There are lignite beds in the near neighbourhood, and it has famous saline-alkaline springs. Pop. (1921) 28,892.

Terai, *see* TARAI.

Teramo (anct. *Interamnium*), a tn. in Italy, cap. of prov. of same name. It is the seat of a bishopric, and has a fine cathedral and several churches. Chief manufs., wool, silk, straw hats, and pottery. The tn. consists chiefly of narrow lanes, but has one broad street with large houses. Pop. (prov.) 205,000, (tn.) 27,000.

Teraphim, a word occurring fifteen times in the O.T. The T. were images of household gods, occupying the place of the Lares and the Penates among the Romans. Six times in the A.V. it is thus transliterated (especially in Jud. xvii. and xviii.), seven times it is translated 'images' (Gen. xxxi. 19, 34, 35, etc.), once it appears as 'idols' (Zech. x. 2), and once as 'idolatry' (1 Sam. xv. 23).

Teratology, the science dealing with abnormal developments or formations of parts of the body, and with monstrosities. *See* DEFORMITY, DWARF, BOTANY, HYBRID, GALLS, GIANTS, ALBINISM, HERNIA, CLUBFOOT, HERMAPHRODITE, PATHOLOGY, etc.

Terbium, a metallic chemical element, symbol Tb, atomic number 65, atomic weight 159.2. It is a member of the group of rare-earths (*q.v.*), and is extremely rare.

Terburg, or **Ter Borch**, Gerard (1617-81), a Dutch painter; b. in Zwolle. He studied in Haarlem, Italy, and France, and visited Eng-

land, Germany, and Spain. One of his masterpieces, 'Peace Congress of Münster,' is in the National Gallery, London. His technique was fine, and he could depict emotion, as is evidenced by his 'Paternal Warning' hung in the Amsterdam Museum.

Terce, in Scots law, a real right whereby a widow, who has not accepted any special provision, is entitled to a life-rent (*q. r.*) of one-third of the heritage in which her husband died infest (*see* INFESTMENT), provided the marriage has endured a year and a day and has produced a living child. *See* CURTESY OF ENGLAND.

Terceira, *see* AZORES.

Terebinth, or Turpentine Tree (*Pistacia terebinthus*), the small tree from which Cyprus turpentine is obtained by making incisions in the trunk.

Teredo, or Ship Worm, a genus of lamellibranch molluscs with a long worm-like body clothed in a thin shelly tube or sheath. The true bivalve shell is small and occurs at the thicker end where it protects the various organs. At the more slender end are two tubes, one of which conveys water to the gills and the other expels it with excavated matter. With its sucker-like foot it bores into timber, and is very destructive to ships and piers.

Terek: (1) A former Russian prov., now within the N. Caucasian Area. It included the greater part of the basin of the Terek. Vladikavkas, now the cap. of the Ingush Aut. Area, was its cap. (2) A river of N. Caucasus. It rises to the S. of Mt. Kazbek, and flows through a mountainous dist. until it reaches the tn. of Vladikavkas, then through a fertile region to the Caspian Sea. Length 350 m.

Terence (Publius Terentius Afer) (c. 190–159 B.C.), a Rom. comic poet, b. at Carthage. He was the slave of a Rom. senator, but received a good education from his master on account of his personal attractions as well as his literary tastes, and was soon emancipated. His first play was the *Andria*, said to have been much praised by Cæcilius, the foremost comic poet of the time, and by the publication of this he found himself introduced into the most refined and intellectual circles of Rome. He became acquainted with Scipio, Lælius, and Furius Philus, and through Scipio probably had an introduction to Polybius. He spent some time in Rome, but eventually went to Greece, where he occupied himself with translating the works of Menander, whom he took as his model. Of his works only six are extant: *Andria*, first represented in 166; *Hecyra*, 165; *Heauton Timoroumenus*, 163; *Eunu-*

chus, 162; *Phormio*, 162; and *Adelphi*, which was first acted at the funeral games of L. Æmilius Paulus, 160. The text of the plays with an Eng. trans. by J. Sargeant is given in the Loeb Library (1912).

Teresa, or **Theresa**, St. (1515–82), a Spanish nun, b. at Avila. She entered a Carmelite convent in her native tn. in 1533, but seeing the relaxation of discipline within the religious orders determined on reform, and set about founding a house in which all the original rules of the Carmelite order would be observed. She met with great opposition, especially from the authorities, but having obtained permission from the pope, she established (1562) the anct. Carmelite rule at a small house in Avila which she dedicated to St. Joseph. Here the sisters (at first only four in number) lived subject to the strictest discipline; they wore sandals of rope, slept on straw, ate no meat, and were confined to the cloister to live on alms without regular endowment. After a time the number was increased to thirteen, and T. herself took up her abode with them, spending, as she says, the five happiest years of her life. With the help of St. John of the Cross she established her reform among the Carmelite friars. She was conspicuous for her saintliness, and was favoured with visions, an account of which is contained in her autobiography. Her works include: *The Way of Perfection*, *The Castle of the Soul*, and *The Book of the Foundations*, all of which have been translated by Dalton. *See* Life by Mrs. Cunningham Graham, 1894; also by H. Joy (Eng. trans. 1918).

Tergeste, *see* TRIESTE.

Tergoviste, *see* TARGOVISTE.

Terminable Annuities, *see* under PUBLIC DEBT.

Termini Imerese (anct. *Therma Himeracæ*), a tn. and seaport, prov. of Palermo, Sicily, founded by the Carthaginians in 407 B.C. It has a fine harbour, and trades in oil, cereals, and fish. There are hot mineral springs in the vicinity. Pop. 19,000.

Terminus, in Rom. mythology, was the god of boundaries and frontiers. His worship is said to have been introduced by Numa, who instructed everyone to mark the boundaries of his land with stones consecrated to Jupiter, and to offer yearly sacrifices at these stones. This festival was called Terminalia, and was celebrated on Feb. 23.

Termites (Termitidæ), a family of insects (order Isoptera), characterised by the possession of biting jaws and by the absence of a meta-

morphosis. T. are the only insects other than those belonging to the Hymenoptera which are known to exist in organised communities. In their habits they resemble ants in many respects, and are often called 'white ants,' though structurally they differ from ants very considerably, while their communities are differently composed. The communities consist of 'kings' and 'queens,' which are fertile males and females that have cast their wings by a rupture at a transverse suture close to the root; and of infertile males and females whose wings never develop, and who become 'soldiers' or 'workers' according to the nature of their food. The head is large, and though many forms are blind, others have compound and simple eyes. The 'soldiers' are provided with especially large heads and powerful mandibles. The queen's abdomen becomes enormously swollen, her ovaries producing eggs at the rate of about one per second. She and the king are usually confined in the central cell in the nest, and in case of disaster to them, nymphs are always in readiness to take their places, after stimulation of their reproductive organs by special feeding. T. are confined to the tropical and warmer temperate regions, some species occurring in S. Europe. They feed on wood and waste substances, and construct earthen tunnels and galleries. Some of the tropical species raise vast earthen nests as much as 20 ft. high. They are very destructive, especially of woodwork and of wood foundations of buildings. Wood treated with creosote is immune, and wood that has been attacked may be cleared by fumigation.

Terms : (1) In law the limitation of an estate or the whole time or duration of an estate, as a lease for the T. of twenty-one years, for the T. of three lives, etc. (see also LIMITATION OF ESTATES; SHELLEY'S CASE, RULE IN; VENDORS AND PURCHASERS). (2) The law T. or portions of the year during which the High Court sits. They are four in number, viz., Hilary, which usually begins about Jan. 11 and ends about the end of March; Easter, which begins in the early part of April and ends in the middle of May; Trinity, which begins towards the end of May and ends towards the end of July; and Michaelmas, which begins in the second week in Oct. and ends just before Christmas. The 'Inns of Court' T., called by the same names as the above, are the 'dining terms' for students, who in the process of qualifying for call to the Bar fulfil the notion of residence that obtains in colleges or other places con-

ferring degrees by eating dinners during T. time. (3) In universities and colleges the time during which instruction is regularly given to students, who are obliged by the statutes and laws of the institution to attend lectures. (4) In formal logic, the expression in language of the notion obtained in an act of apprehension. T. are divided into simple, singular, universal, common, univocal, equivocal, abstract, concrete, etc. (see also SYLLOGISM). (5) In algebra, a member of a compound quantity, as a , in $a + b$; or ab , in $ab + cd$.

Tern, or **Sea Swallow** (*Sterna*), a genus of birds resembling the gulls, to which they are allied, but smaller and slenderly built and with a forked tail. They are extensively distributed, especially in temperate climates. Though poor walkers and swimmers, they are very active on the wing, skimming the surface of the sea from sunrise to sunset in search of small fish and other marine animals. A number of species occur in Britain, the commonest of which is *S. fluvialis*, with grey plumage. The others are the sooty T. (*S. fuliginosa*), the Arctic T. (*S. macrura*), the Sandwich T. (*S. castris*). The black T. and other similar species known as marsh Ts. are now placed in the genus *Hydrochelidon*. They are distinguished by their shorter bills, short and slightly forked tails, and less fully webbed feet.

Ternate, a tn. and island in the Malay Archipelago, one of the Molucca Is. The tn. is the headquarters of the Dutch residency of the island, which covers an area of 12,796 sq. m. It has a gov. quay and private pier, but there is no considerable trade or shipping, its harbour possessing no bar. Pop. island (1927) 284,818, tn. 19,000.

Terneuzen, see NEUZEN.

Terni, a tn. in Perugia, Italy, among the Apennines, with important steel works and iron foundries. There are interesting antiquities, and it is the birthplace of the Emperor Claudius. Near by is the famous Velino waterfall, affording water power for the iron works and factories of the tn. Pop. (1928) 71,442.

Terpander, the father of Gk. music, and through it of lyric poetry. He was a native of Antissa in Lesbos, and flourished between 700 and 650 B.C. See Smyth's *Greek Melic Poets*, 1900.

Terpenes, the name given to hydrocarbons which occur in essential oils and have a molecular formula $C_{10}H_{16}$. They are all volatile, and are unsaturated compounds. The most important members are limonene, camphene, and pinene (*q.v.*). They are

probably derivatives of cymene (para-methylisopropylbenzene).

Terpsichore (Gk. 'delighting in the dance'), the muse of choral song and dance. See **MUSES**.

Terra, or **Tellus**, see **GÆA**.

Terrace Gardens are a series of flat walks or gardens, usually constructed where the ground slopes sharply from a house on one or more sides of it. The soil is retained by means of stone or brick walls, which themselves offer considerable scope for decorative effect. The terraces are usually made broad and laid out in beds as flower gardens, and are connected to one another by stone steps.

Terraces are level stretches of land occurring as marked interruptions of sloping ground. **River T.** occur wherever the valley has been sufficiently widened and graded to allow formation of flood-plain. On reducing the level of its flood-plain, the portions resting on the valley slopes are left as ledges which remain until weathered away; two or three of these are often traceable, and are useful in constructing the history of the river. Smaller **T.** are formed in higher courses of rivers by the washing up of material forming the banks; they are not level, but have a slight gradient towards the river. **Lake T.** are similarly formed. The age of such formations is prehistoric, and they are in consequence particularly valuable geologically, affording evidence of aquarian life and plant life on the anct. banks. Remains of animals are numerous, as the **T.** were frequented in various parts as watering-places, and many animals fell as prey. Evidences of human life and industry are also found, particularly stone implements. **Shore T.** are due to the washing up of sand, shingle, and gravel with organic remains by the storms and high tides. **River, lake, and shore T.** are all found in raised positions due to movements of the earth's crust, and form a valuable means of measuring these in amount and time. **Raised T.**, or beaches, as they are called, are common in Norway and Scotland, where they form striking features of the landscape; when formed by the sea they are horizontal or slightly sloping away from the water. A terrace formation occurs geologically when denuded land is formed of horizontal strata; the residual hills and mountains are flat-topped with terraced sides. This is a marked feature of the formation of the whole continent of Africa; the most remarkable instance, however, is found in the Colorado region of Western U.S.A., where the dry climate preserves the natural features. Such **T.** are also the result of past volcanic

action, the levels being formed of successive flows of lava; the islands N. and W. of Scotland, and Antrim in W. Ireland, are good examples. **Cultivation T.** are commonly found in dry mountainous regions, such as Spain and Tibet; they were a marked feature in the old civilisation of Peru, and are still preserved and worked. Advantage is taken of any inequality in the mountain side, and successive generations of cultivators gradually extend the levelling; such a **T.** retains water fairly well, and the soil being virgin and continually renewed is generally of great fertility. The *Pink and White T.* of New Zealand were due to the action of hot springs; the water, being highly charged with dissolved calcareous and siliceous matter, on reaching the air and cooling deposited the sinter in level terrace formation. These beautifully coloured formations were destroyed in 1886 by an earthquake.

Terracina, a maritime tn. of Italy on S. coast of prov. of Rome and 60 m. S.E. of that city. Trades in wool and cereals. It possesses the celebrated temple of Venus, thought to be the palace of Theodorici. Pop. (tn.) 10,000, (commune) 12,500.

Terra Cotta, baked clay used for bricks, tiles, and architectural ornaments, as well as for tombs and coffins, statues and statuettes. It may be left with its natural brown surface unglazed and uncoloured, or it may be painted as was customary among the Gks., or it may be covered with a solid enamel of grave or brilliant colours. The Louvre, British Museum, and the museums of Berlin and Athens have remarkably fine collections of the Gk. and Rom. **T. Cs.**, and many other cities, such as Florence, Perugia, Rome, Naples, Nîmes, and Arles, also have collections of importance. In the Victoria and Albert Museum, London, there is a remarkable collection of fine Florentine **T. Cs.** of the best periods. In parts of Italy the architecture of the later Gothic style and of the early Renaissance is marked by a free use of **T. C.** In the nineteenth century its use was largely revived, and it has been employed in England for architectural work (*e.g.* Natural History Museum at S. Kensington, as well as in other large tns.), being especially suitable as a building material because of its capability of resisting the acids and soot contained in the atmosphere. The term **T. C.** includes all permeable ceramic products that are unglazed, having a body that cannot be heated to a temperature beyond 1375° C. (the same heat that is used for firing hard porcelain), without becoming vitrified or losing shape. Usually

T. C. is fairly soft, though some cannot be scratched by iron or steel. The colour of T. C. varies from yellow to red and reddish-brown—while occasionally it is grey, black or white. T. C. is of very anct. origin, vases of T. C. being found in the tombs of the Memphian period, 5000–3000 B.C. The Phœnicians and Gks. did not make use of glazes, but manufactured T. C., and developed the art to such an extent that it spread to nations on the Mediterranean and in the N. of Europe. T. C. figures of great antiquity have been found in Crete, Melos and Cyprus. The Gk. art of moulding statuettes in T. C. began with representations of deities, but was extended to natural forms in realistic attitudes. The best examples of the latter are the figures found at Tanagra, dating from 400 and 300 B.C. The making of bricks in T. C. is a very anct. industry. Anct. bricks used by the Egyptians, Assyrians, and Roms. were larger than those made to-day and were usually in the form of slabs. Roof tiles are yet another form of T. C., and these also date from early times. There are many forms of tiles, such as Rom., Mediæval, Round, Rib, Scale, Mountain, and Plain.

Consult Murray's *Handbook of Greek Archaeology*, 1892; Anderson and Spiers, *The Architecture of Greece and Rome*, 1902; Walters, *Ancient Pottery*, 1905, *The Art of the Greeks*, 1906; T. L. Shear, *Terra-Cottas*, 1926; and the *British Museum Catalogue of Terra Cottas*.

Terra del Fuego, see **TIERRA DEL FUEGO**.

Terra di Lavoro, see **CASERTA**.

Terra-firma, a term used to denote main or continental land as opposed to insular. The name was particularly used in the Middle Ages for that part of the Italian mainland which was subject to Venice.

Terra Japonica, see **CATECHU**.

Terranova, a seaport on the S. coast of Sicily in the prov. of Caltanissetta. It was founded at the end of the thirteenth century on the site of the anct. Gela. Manufs. coarse cotton and woollen goods, and has fisheries of tunny and sardines. Exports wine, grain, sulphur, and soda. Pop. 23,270.

Terrapin, a name given to various tortoises of the family Emydidae, some of which are highly valued as food. Among the most important are the yellow-bellied, the red-bellied, the chicken, and the salt-water Ts. They are all active swimmers, their clawed digits being united by a web. They are almost omnivorous, but feed chiefly on aquatic animals. In America and Australia they are

commonly kept and fattened in captivity.

Terre Haute, a city of Indiana, U.S.A., co. seat of Vigo co., on Wabash R., 68 m. W.S.W. of Indianapolis. The centre of an agricultural and a coal-mining region, it has foundries and manufs. iron goods, cars, clothing, glass, etc. There is a state normal school and polytechnic engineering institute. Pop. (1930) 62,810.

Terrell, a city of Texas, U.S.A., Kaufman co. Cotton is the chief manuf. Pop. (1930) 8795.

Terrestrial Magnetism, see **MAGNETISM**.

Terrier, a term originally applied to dogs which pursue rabbits and other game into their burrows, but now applied to a number of breeds most of which are too large and some too pampered to justify their name. The best known are the Smooth and Wire-haired Fox T., the Scotch or Aberdeen T., the White West Highland T., the Dandie Dinmont, the Bedlington, the Airedale T., the Irish T., the Welsh T., the Sealyham T., the Bull T., the White Eng. T., the Black and Tan T., the Yorkshire T., the Skye T., and the Clydesdale T.

Terriess, William, originally William Charles James Lewin (1847–97), an Eng. actor, after serving for a short time in the merchant service, went on the provincial stage in 1867, and soon came to London. His best parts were Squire Thornhill in *Olivia* and William in *Black-eyed Susan*. He was assassinated at the stage door of the Adelphi Theatre, where he played leading parts, by an unsuccessful actor. Life by Arthur Smythe, 1898.

Territorial Army. In 1859 the scare of a Fr. invasion of England became so real that many measures were taken to resist with force any such attempt. One of the steps taken was the formation of volunteer rifle corps, a great number of which was created between 1859 and 1863 under an Act of 1861, which had been passed in order to meet a previous Fr. threat. When the British infantry was territorialised under Lord Cardwell's scheme in 1881, volunteer rifle corps were linked with regular and militia units to form the Regimental District. However, the liaison between the regular and volunteer units was of the slightest, a defect remedied by Lord Haldane in 1908 by creating the Territorial Force under the Territorial and Reserve Forces Act, 1907. County Associations were formed which raised and administered (but did not command) the Force. The Territorial Force was intended

for home service only, but provision was made for members to offer themselves for service overseas. The strength was estimated at 11,900 officers and 302,200 other ranks. The new Force was non-professional in character, but provision was made for its co-operation and training with the regular forces. The permanent staff of the Territorial Force was composed entirely of regular officers and N.C.Os. During the Great War every unit volunteered for service overseas, and Territorial Force units fought on every front where British troops were found, and on the Near and Far Eastern fronts they predominated. For distinguished services and the reaping of honours the Territorial Force was no whit behind its regular colleagues. Hitherto the Territorial Force had been considered as forming the third line of defence in the military organisation: Regular Army, first; Special Reserve, second; Territorial Force, third. After the Great War the Special Reserve was renamed militia, but the force ceased to be raised. The Territorial Force was reorganised in 1920 and redesignated 'Territorial Army,' and became the second line. Its organisation was revised to correspond as closely as possible with that of the regular army. Only members who accept the liability for service overseas are accepted for enlistment and all arms of the service are represented. In 1921 a number of yeomanry regiments of the T. A. were converted into artillery units and others into armoured-car companies of the Royal Tank Corps. The T. A. is composed of fourteen divisions, two cavalry brigades; army troops, air defence formations, and coast defence units. Commanders of brigades and higher formations are usually regular officers. Officers of the T. A. must be British subjects, sons of British subjects, and of pure European descent. Promotion conditions follow much the same lines as for regular officers (see MILITARY EDUCATION) as far as possible. The periods of training and number of drills to be performed vary with the arm of the service to which the officer belongs, e.g. in most corps the number of drills to be performed in the 'Preliminary Training' period is forty to forty-five, whereas in the R.A.S.C. the number is only ten. The same rule applies to men. The age for enlistment of men is between eighteen and thirty-eight years; the term is for four years, with subsequent extensions of service for further periods of four years.

The T. A. can be embodied only when the Army Reserve has been called out by Royal Proclamation in

case of imminent national danger or great emergency, the occasion being first communicated to Parliament, if Parliament is then sitting. If Parliament is not sitting, it must be called together within ten days of the issue of this Proclamation. Men of the T. A. despatched abroad under the authority of an Act of Parliament will not be used for the purpose of supplying drafts for the Regular Army. They will serve together in regimental units. Where, in case of special military emergency, attachments of men from one unit to another are inevitable, such attachments will be temporary and men so attached will be returned to their own units at the first opportunity. (T. A. Regulations, 1929.)

Territorial War Medal. The grant of this medal was approved in 1920. It is a special medal awarded to all members of the Territorial Force who were serving on Aug. 4, 1914, and to all ex-members of the Territorial Force who had served for a period of not less than four years in the Territorial Force prior to the War and who rejoined the Force on the outbreak of war; provided (1) that they undertook to serve overseas on or before Sept. 30, 1914 and were accepted for service overseas; and (2) that they were not entitled to the award of the 1914 Star or the 1914-15 Star.

Territorial Waters. Most modern states recognise the sovereignty of every other state over its own marginal waters. The limit is generally fixed at one marine league from the shore measured from low-water mark. This distance of permissible appropriation is the subject of much criticism by writers on international law, because it was in its origin suggested by the supposed range of a gun; the tremendous range of modern artillery has made the distance meaningless (see on this Hall, *International Law*). The acquittal for want of jurisdiction of a Ger. prisoner charged at the Central Criminal Court with manslaughter through the running down of the *Strathclyde* by the *Franconia* (in the famous trial of Reg. v. Keyn, 1876) two m. off Dover led to the passing of the Territorial Waters Jurisdiction Act, 1878. By that Act the Eng. courts have jurisdiction to arrest and try persons, whether British subjects or not, for offences committed on the high seas within the T. W. of the crown, i.e. within one marine league from the coast. The League of Nations has entertained a proposal to vest in Member States an unlimited right of dominion over their adjacent seas to a distance of six marine m., subject to various

restrictions; but hitherto opposition to the proposal has prevented its adoption (see also JURISDICTION). Since prohibition was adopted in the U.S.A. and steps were taken to prevent smuggling of liquor, the U.S.A., by treaty with Great Britain and 12 other powers exercises the right to search and seize suspected liquor ships within 12 m. of the coast.

Terror, Reign of, see FRANCE—History.

Terry, Dame Ellen Alice (1848–1928), Eng. actress; b. Feb. 27, at Coventry; second daughter of Benjamin T., actor. Made her first appearance on the stage as the boy Mamillius in *The Winter's Tale* in 1856 at the Princess's Theatre under the management of Charles Kean. In



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DAME ELLEN TERRY

same company she played Puck in *Midsummer Night's Dream*, and Arthur in *King John*. Acted in provs. 1860–63, for some time in stock company of the Chutes at Bristol with her elder sister Kate. In 1863, played in various companies in London, including the rôle of Beatrice in *Much Ado*. In Feb. 1864 she was married to the painter George Frederick Watts—nearly thirty years her senior: they parted June 1865. Returned to stage, 1867, at Queen's Theatre, Long Acre, where she first acted with Henry Irving; they played Katharine and Petruchio in Garrick's version of the *Taming of the Shrew*. Retired again, 1868. Returned to stage of Queen's Theatre, 1874. In 1875, scored a great success as Portia in *The Merchant of Venice*, revived at

Prince of Wales's Theatre under management of the Bancrofts. While in John Hare's company at the Court Theatre, she married E. A. Wardell (Charles Kelly, d. 1885), and won great praise for her Olivia in Wills's *Fear of Wakefield* in 1878. The same year she was engaged by Irving as leading lady at the Lyceum, where she acted constantly for thirteen years—appearing as Ophelia, Portia, Desdemona, Juliet, Beatrice, Viola, Lady Macbeth, Katharine in *Henry VIII.*, Cordelia, Imogen, and Volumnia in *Coriolanus*. At the Lyceum she also played the title-part in *Nance Oldfield* in 1891, Rosamund in *Becket* in 1893, and Clarisse in *Robespierre* in 1899. She appeared with Mrs. Kendal in Tree's revival, at His Majesty's, of *The Merry Wives of Windsor*, in 1902. Her stage jubilee was celebrated in 1906. In 1907 she married James Carew, an American actor. She published *The Story of My Life*, 1908. Among her later parts were: Cicely Waynflete in Shaw's *Captain Brassbound*, and Alice in Barrie's *Alice Sit-by-the-Fire*. Strongly supported the Women's Suffrage movement. Received several honorary degrees, and in May 1922 the Grand Cross of the Order of the British Empire. Died at The Farm, Small Hythe, Tenterden, Kent, July 21. Ashes laid to rest in St. Paul's Church, Covent Garden, London, 1929. See *Ellen Terry and her Secret Self*, by her son, E. Gordon Craig, 1931; also *Ellen Terry and Bernard Shaw: A Correspondence*, 1931.

Terry Family. Eng. actors and actresses. **Benjamin Terry** (1818–92) and his wife were well-known provincial actors, although in their later years they also had engagements in London with Macready and Charles Kean. Their children were: (1) *Kate Terry* (b. 1844), the eldest of the family, made her first appearance on the stage in 1850, and the next year came to London and was engaged by Charles Kean. She played Robin in *The Merry Wives of Windsor* and Prince Arthur in *King John*, in which part she was much praised by Macaulay. She subsequently appeared as Cordelia, Ophelia, Ariel, Juliet, Viola, all of which she played with remarkable success, but especially made a great hit in 1862 by her part of Mrs. Union in *Friends or Foes*. Other famous impersonations were as Monee in *Up at the Hills*, Blanche de Nevers in *The Duke's Motto*, and Mary Leigh in Boucicault's *Hunted Down*, and she also made the part of Alice in *A Sister's Penance*. She retired from the stage on her marriage, but reappeared in 1898 in *The Master*, pro-

duced by Mr. John Hare at the Globe. (2) *Ellen Terry* (q.v.) was b. in 1848. (3) Her sister *Marion Terry* (b. 1856) won a great reputation as an actress, notably in *Lady Windermere's Fan*, in which she reappeared in 1911 at St. James's Theatre. (4) *Florence Terry* (d. 1896) played in *The Iron Chest* with Irving, and was the original Little Nell of Halliday's play. (5) *Fred Terry* (b. 1865) first appeared on the stage in 1880 under the Bancrofts. Together with his wife, Julia Neilson, he played in *Sweet Nell of Old Drury*, *Hyppatia*, *As You Like It*, *The Scarlet Pimpernel*, *Henry of Navarre*, etc. His daughter *Phyllis* made a name as an actress in Shakespearean plays.

Terschelling, one of the W. Frisian Is., belonging to the Netherlands. It is 16 m. long and 3 m. broad. Hoorn and Westerschelling are the chief villages. Pop. 3652.

Tertian Fever, see MALARIA.

Tertiaries (*Tertius ordo de pœnitentia*), associations of men and women living in the world but connected with certain religious orders, who practise the religious life as much as their state will allow. Such associations were first regularly formed by St. Francis of Assisi, and they have since produced much fruit. Previously he had founded two orders—the Friars Minor and the Poor Clares. Whence the name 'Third Order.' See N. de Robeck, *Among the Franciscan Tertiaries*, 1930.

Tertiary, in geology, a system which includes all the sedimentary accumulations formed between the close of Cretaceous time and the beginning of the Glacial Period. The system is divided into four groups, viz. Eocene, Oligocene, Miocene, and Pliocene, according to the percentages of recent mollusca contained. The strata of the system are of great lithological variety, and are found in the structure of all the continents and their great mountain chains. The Alps, Himalayas, Atlas, Carpathians, and Cordillera were formed in T. time. The T. crust movement was accompanied by volcanic action ranging from Auvergne to the Carpathians and through the Mediterranean. The volcanoes of the Andes, Iceland, and Japan began their operations about this time. During the time of the deposition of the T. strata, the older forms of life became extinct and their place taken by the present-day species of animals and plants. The climate of the period was at first warm and moist, but gradually became colder and colder, and culminated in the glacial periods of the Pleistocene. See EOCENE, OLIGOCENE SYSTEM, MIOCENE, and PLIOCENE.

Tertullian, or, more fully, **Quintus**

Septimius Florens Tertullianus (c. 160–230), the earliest of the Latin ecclesiastical writers. He early embraced the profession of an advocate or rhetorician, in which he appears to have attained to some eminence. In all probability it was at Carthage that he was converted to Christianity, and upon his conversion he was ordained a presbyter, though where we are not told. He himself speaks of having been at Rome, and we know that he could write Gk. His conversion probably took place about 190. About the end of the second century he became a Montanist. Jerome ascribes this change to his suffering from the envy and insults of the clergy of the Rom. Church, but a more adequate and more probable reason for it is to be found in the character of T. himself. T. holds one of the first places, if not the very first, among the Latin fathers for learning and intellectual power. His writings are apologetic, practical, and doctrinal. The best edition is that in the *Vienna Corpus Scriptorum Ecclesiasticorum Latinorum*, vol. xx. (1890).

Teruel: (1) A prov. of N.E. Spain, with an area of 5720 sq. m. It is extremely mountainous, the highest point being Mt. Javalambre, in the S. (6568 ft.). It has several large rivers, the principal being the Tagus, Guadalquivir, and Guadaloupe. Chief products, corn, oil, wine, fruits, timber, etc.; and industries, agriculture, mining, and weaving. Pop. (1928) 259,850. (2) Cap. of above prov., situated on the l. b. of the Guadalquivir. Has a cathedral dating from the sixteenth century, and is the seat of a bishopric. Pop. 12,010.

Teschen, or **Cieszyn**, a tn. of Silesia, Poland, formerly in Austria. 50 m. S.E. of Troppau, on the R. Olsa. Peace was made here in 1779 between Austria and Prussia. It has furniture factories and saw-mills, and manufactures cloth, linen, spirits, etc. It is an old tn., and has the remains of an anct. castle dating from the twelfth century. Pop. 24,000.

Tesla, **Nikola**, electrician and co-worker with Edison; b. 1857, at Smiljan, Lika (border-country of Austria-Hungary). Emigrated to America in 1882. Chiefly noted for the Tesla coil; this is of low self-induction, but produces a rapid alternating oscillatory current capable of long-distance transmission. It induces luminosity in a Tesla tube placed near. The currents have been experimented with for the cure of lupus. From 1903, chiefly engaged in developing telegraphy and telephony, and on plant for transmission of power from Niagara.

Tesla Coil, see TESLA, NIKOLA.

Tessin. There are three eminent Swedes of this name, father, son, and grandson.

Nicodemus Valentinson Tessin (1619-88), *b.* at Stralsund, held the appointment of royal or crown architect. One of his chief works is the palace of Drottningholm, begun by him for the queen-dowager Hedwig Eleonora (widow of Charles Gustavus), but completed by his son. He erected the royal villa of Strömsholm, and the mausoleum of Charles Gustavus.

Count Nicodemus Tessin (1654-1728), son of the above, was *b.* at Nyköping. He was educated first at Stockholm, afterwards at Upsala, and then studied architecture at Rome under Bernini. He visited Naples, Sicily, and Malta, and returned to Rome, at which place he received from Sweden his appointment as court-architect in 1689. The destruction of the royal palace by fire in 1697 afforded him an opportunity to render the new edifice one of the noblest of its kind in Europe. He took a considerable share in public and political affairs.

Count Charles Gustavus Tessin (1695-1771), the son of Count Nicodemus, was *b.* at Stockholm; a statesman and diplomatist. He was ambassador at the court of France in 1739-42 and president of the chancery from 1747 to 1752. He first established the Swedish Academy for Painting and Sculpture in 1735.

Tessin, *see* TICINO.

Test Acts: (1) By the Test Act, 1673, all officers, civil and military, were obliged within six months after appointment to make a declaration against transubstantiation, take the sacrament in accordance with the ceremony of the Eng. Church, and take the oath of supremacy (*q.v.*). This Act was usually conjoined with the Corporation Act, 1661, which compelled all holders of municipal offices to take the sacrament—a provision aimed at the Presbyterians. Lord John Russell in 1828 carried a motion for their repeal. (2) The Parliamentary Test Act of 1678, which was passed after the perjured evidence of Titus Oates, and is now repealed, prohibited Rom. Catholics from sitting in parliament.

Testament, *see* BIBLE, NEW TESTAMENT.

Testament, *see* WILLS AND TESTAMENTS.

Testamentum Domini, a book of church order of the fifth century, belonging to the same class of writings as the Apostolic Constitutions. It was originally written in Gk., but is extant only in Arabic and Syriac, in which versions it occurs as the first volume of the Clementine octateuch. A complete edition was published in

1899 by I. E. Rahmani, Patriarch of Antioch (at Mainz), and there is an Eng. translation by J. Cooper and A. J. Maclean (1902).

Testimony, *see* DECLARATIONS OF DECEASED PERSONS.

Testing Clause, in Scots law, the technical name for the clause in written deed or other formal legal instrument which authenticates the document according to the forms of law. It contains the name and designation of the writer of the instrument, a record of the number of folios of which it consists, and the names and designations of the witnesses to the writer's signature.

Testing, Electric, *see* ELECTRICITY.

Test-papers are paper slips impregnated with some chemical reagent. Litmus papers are used for testing for acids and alkalis, acids turning the blue variety to a red colour and alkalis turning the red papers to a blue. Paper containing lead acetate is used as a test for hydrogen sulphide, which turns it brown. Oxidising agents, such as chlorine, ozone, etc., are tested for with papers containing potassium iodide and starch, which are turned blue by their presence. Turmeric paper, yellow in colour, is used as a test for alkalis and boric acid, which cause it to become brown.

Testudinaria, or **Elephant's Foot**, a genus of deciduous climbing plants (order Dioscoreaceæ), sometimes grow in the greenhouse. *T. elephantipes* forms a huge fleshy root-stock much of which is above ground, and from it issue stems of great length bearing small greenish-yellow flowers. The roots are sometimes eaten by the Hottentots.

Testudo, the technical name applied to a Rom. military formation which was used when attacking fortified positions. The soldiers who were attacking raised their shields well above their heads and interlocked them. They were thus able to approach the fortified position with little danger of being badly injured by missiles dropped from above.

Testudo, *see* TORTOISE.

Tetanus, or **Lockjaw** (from Gk. *τείνειν*, to stretch), an infectious disease characterised by violent muscular contractions. The cause of the disease is the introduction into a wound of the *Bacillus Tetani*. The existence of this micro-organism was demonstrated by Nicolaier in 1885, but a pure culture of it was first obtained by the Japanese scientist, Kitasato, in 1889. The germs are not themselves carried away in the bloodstream, but they set free toxins or poisons of unparalleled virulence, *see* *toxins* of a drop of a cultivated ex-

ample having been known to kill a mouse. The toxin acts upon the cells of the central nervous system, and the voluntary muscles are very quickly out of the control of the sufferer. The bacillus of T. is found in soil, animal excrement, etc., and it obtains an entrance to the body through a wound which has become contaminated with dirt. There is no truth in the supposition that wounds in the thumb are particularly liable to set up tetanus. The duty of cleaning a wound which has come into contact with soil should never be neglected, as the development of the injurious toxin proceeds with fatal rapidity. The first sign of the disease is a feeling of stiffness at the back of the neck; the muscles of the jaw are then affected, with the result that the mouth is opened with difficulty, and afterwards becomes closely shut. The stiffening of the muscles proceeds to the body and limbs, until parts of the body become absolutely rigid to the touch. Besides the constant rigidity, there occur convulsions at intervals which may be as short as ten minutes. The muscles are then contracted with such violence that they may become ruptured or lead to the fracture of a bone. The absence of complete relaxation serves to distinguish lockjaw from the spasms associated with strychnine poisoning. The treatment of T. should commence with an effort to make the wound surgically clean. Morphia or chloroform should be used to lessen the pain caused by the spasms. T. antitoxin has been found useful as a prophylactic, but when a patient has been demonstrably attacked the development of the toxin has usually proceeded too far for any injection-treatment to be of avail.

A considerable measure of success attended the results of inoculation of troops during the Great War. Of 1,242,000 wounded sent home and treated, 1459 developed T., or only about 1 per 1000. In Sept. 1914, the incidence was at the rate of 8 per 1000; by Dec. 1914 it was only 1.4; by 1918, 0.7. This fall was due to the introduction of anti-T. serum, given immediately after a wound had been sustained. T. is much more likely to be fatal if it occurs soon after a wound than if its onset is delayed. Thus an onset within a week of wounding gave a death-rate of 60 per cent., whereas when the onset was delayed to 36 days, the rate was only 15 per cent. Of those who had not had serum, T. occurred in 50 per cent. between the eighth and fourteenth days, and only in 5 per cent. over thirty-five days; in those inoculated only 20 per cent. developed the disease at an early period, whereas 40

per cent. developed it after 35 days. Thus as inoculation became more thorough—more injections being given and more care exercised in the light of increased knowledge—a vast improvement took place. Not only was the incidence reduced from 8 per 1000 to about 0.7, but those who did fall victims to the disease were attacked after much longer periods of time, and so had a much better chance of recovery—the difference between 60 per cent. and 15 per cent. Further than this, the cases which did occur became much more restricted in extent. The proportions of local to general T. were: general, 98.9 in 1914 and 83.5 in 1918; local, 1.1 and 16.5 respectively. Among wounded men who received at least one preventive dose, the death-rate fell from the old pre-serum rate of 85 per cent. to 23 per cent., a saving of 62 soldiers in every 100 attacked by the disease (see paper by Sir David Bruce, Chairman of the War Office Committee on Tetanus, published by the Research Defence Society in 1920).

Tete, or **Tette**, a tn. of Portuguese E. Africa, on the Zambesi. Formerly of some commercial importance, its trade has declined. It is 110 m. from Blantyre, and on the route of the telegraph line connecting that town with Salisbury.

Tête de Pont, a technical term in fortification meaning bridge-head (*q.v.*).

Tethys (*Τηθύς*), in Gk. mythology, was the daughter of Uranus and Gæa, and the wife of Oceanus, by whom she was the mother of the Oceanides and the river-gods. She was also the instructress of Hera.

Tetrabelodon, see **MCERTHERIUM**.

Tetrachord, see **HARMONY**.

Tetrahedron, see **POLYHEDRON**.

Tetrao, see **BLACKCOCK**, **CAPER-CAILLIE**, and **GROUSE**.

Tetrarch, the ruler over the fourth part of a country. The term was borrowed by the Romans from the Gks., with whom, however, it had quite a different meaning. On the death of Herod the Great, his dominions were divided among Archelaus, Herod Antipas, and Herod Philip. Part remained under the direct rule of a Rom. procurator.

Tetrazzini, Luisa (Signora Bazelli), Italian soprano; b. June 29, 1871, in Florence. Pupil of her sister Eva (Mme. Cleofonte Campanini). Debut: Florence, 1895, as Inez in *L'Africana*, Teatro Pagliano. Toured Spain, Portugal, Russia, S. America, Mexico; in 1904 became famous in San Francisco. Appeared in London at Covent Garden, Nov. 2, 1907, as Violetta in *La Traviata*. In 1908-10, leading figure at Manhattan Theatre, New York. Travelled with concert-troupes in

the U.S.A., 1910-13. Chicago Opera, 1913-14. Successful both in singing and in acting. Relief work in Florence during War. Toured America, 1919-20. Favourite parts: title part in *Lucia di Lammermoor*; Amina in *La Sonnambula*. Other rôles: Marguerite de Valois in *The Huguenots*; Leila in *Les Pêcheurs de Perles*. In 1921, published reminiscences, *My Life of Song*.

Tetricus, Caius Pesuvius, the last of the pretenders who ruled Gaul during its separation from the empire. He reigned from A.D. 267 to 274, when he was defeated by Aurelian at Chalons.

Tetschen, or **Děčín**, a tn. of Bohemia, Czechoslovakia, 83 m. N.N.E. of Prague, on the r. b. of the Elbe opposite Podmokly. It is a busy industrial tn. and a large riv. port. Pop. 11,200.

Tetuan, a tn. of Morocco, on the Mediterranean, 40 m. S.E. by E. of Tangier, and a few m. S. of the Strait of Gibraltar. The tn. is well fortified, surrounded by walls and a citadel. The chief industries are tile works, inlaying, and the manuf. of yellow slippers. Here resides the Spanish High Commissioner who administers the Spanish zone of Morocco. Pop. 24,000.

Tetzel, John (c. 1455-1519), a Dominican friar, who by the scandalous manner in which he carried on the traffic in indulgences roused Luther to precipitate the Reformation. This occurred in 1517. See *Lives by Korner* (1880) and *Hermann* (2nd ed. 1883).

Teucer (Τεύκρος): (1) Son of the river-god Scamander and the nymph Ideia, was the first king of Troy. The Trojans are sometimes called 'Teucroi' after him. (2) Son of Telamon and step-brother of Ajax. He was celebrated for his archery among the Gks.

Teucro, see **TEUCER** and **TROY**.

Teutoburger-Wald, a range of hills in N.W. Germany extending along the borders of Hanover and Westphalia and through Lippe. The greater part of the chain is densely wooded. Mt. Barnackow, in Lippe, is the highest peak (1490 ft.). It was the scene of the battle (A.D. 9) in which Arminius and the German tribes defeated the Roman legions under Quintilius Varus.

Teutones, a tribe of northern Europe which in the time of Pytheas inhabited the coasts of the northern seas. They became known to the Romans in 103 B.C., and the following year were defeated, with the Ambrones, at Aquæ Sextiæ by Marius.

Teutonic Knights, one of the great semi-religious orders of knights founded during the period of the crusades. The order originated in a

brotherhood formed by certain German merchants of Bremen and Lübeck during the siege of Acre in 1190. A hospital was started, and thence came the foundation of the Teutonic Knights of the Hospital of St. Mary of Jerusalem. The new order, distinguished by a white mantle with a black cross, was formed on the model of the Knights Hospitallers, and its members were also pledged to tend the sick, to protect the church, and to wage war against the heathen. In 1198 the hospital was turned into an order of knighthood, and in 1237 it absorbed the order of the Brethren of the Sword. The Teutonic Knights conquered Lithuania and the Baltic regions of Prussia during the thirteenth and fourteenth centuries. Their defeat at the hands of the Poles and Lithuanians at Tannenberg struck a great blow at their prestige and the order declined rapidly. In 1525 the 'high master,' Albert of Brandenburg, was converted to Protestantism, and the order was secularised. It was suppressed by Napoleon in 1809.

Teverone River (Italy), see **ANIO**.

Teviot, a riv. in Roxburghshire, Scotland, rising in the S.W. and following a N.E. course of about 40 m., joining the Tweed at Kelso. Has good salmon and trout fishing.

Teviotdale, the name of that part of Roxburghshire, Scotland, drained by the Teviot and its tributaries.

Tewfik Pasha, Ahmed, Turkish statesman, b. Feb. 11, 1845, in Constantinople; son of Ismail Hakki Pasha. In Ministry of Foreign Affairs, 1866-72; next in Athens legation; then in St. Petersburg till war with Russia, 1877. Minister in Athens, 1878. Ambassador, Berlin, 1885-95. Minister of Foreign Affairs, 1895-99. Ambassador, London, 1909-14. After Great War, Grand Vizier and then president of Senate. At London Conference, 1921. In 1922 he attended the Genoa Conference as head of the Constantinople Delegation and, later in the same year, he went to Mecca with the Emir Abdulla of Transjordan, this being his last official activity. Retired in 1922.

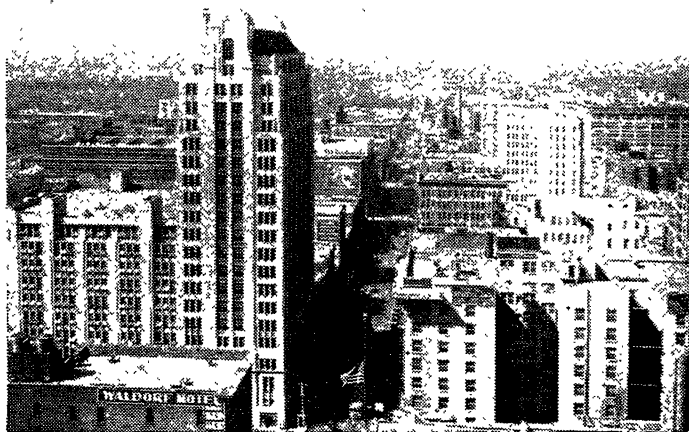
Tewfik Pasha, Mohammed (1852-92), Khedive of Egypt. He was the eldest son of Ismail Pasha, and succeeded him in 1879. At that time Egyptian finances were under Anglo-Fr. control, and the country was in a great state of unrest politically. In 1882 the rebellion of Arabi Pasha occurred, which resulted in a British Protectorate being established and put an end to Fr. influence. The revolt of the Mahdists in 1884-85 led to the loss of the Sudan and Upper Nile in spite of the British expeditions. T.

had only one wife, Anima Hancm, whom he married in 1873.

Tewkesbury, a municipal bor. and market tn. in Gloucestershire, England. It is situated on the Avon just where it joins the Severn, 10 m. N.E. of Gloucester. The abbey church dates from the twelfth century (1125) and is a very beautiful building. It possesses a massive tower, and has a number of radiating choir chapels in the Decorated style, and a curious W. front, with an immense archway and window and a recessed porch. The interior contains some interesting monuments and some fine old glass. Ruins are all

way engines are the chief manufs. Pop. (1930), T. in Texas, 16,602; T. in Arkansas, 10,764.

Texas, the southernmost of the central states of the U.S.A. and the largest (265,896 sq. m.) in the Union, with a coast-line along the Gulf of Mexico, stretching for 370 m. from Mexico N.E. to Louisiana. It is more than three times as large as Great Britain. In fact Russia alone of European countries exceeds it in area. Its extreme length is 760 miles and extreme breadth 620 m. It is separated from Mexico, on the S.W., by the shifting Rio Grande; New Mexico and Mexico border it on the



THE SANTA FE BUILDING, DALLAS, TEXAS

[E.N.A.]

that remain of the great Benedictine abbey that once flourished here and dated back to Saxon times (c. 715). The town contains many other old buildings, including the grammar school, almshouses, etc. T. occupies the site of a Rom. encampment, and in 1087 it was a borough and market. It received charters in the reigns of Edward III., Elizabeth, and William III. It was the scene of a battle during the Wars of the Roses (see ROSES, WARS OF). Pop. (1931) 4352.

Texarkana, the name given to two cities which are adjacent, one being the co. seat of Miller co., Arkansas, U.S.A., and the other of Bowie co., Texas. The chief articles of trade are lumber, cotton, cotton-seed, and oil, while machinery, furniture, and rail-

W., Oklahoma and New Mexico on the N., and Arkansas, Oklahoma and Louisiana on the E. The general slope is N.W. to S.E. The 'Llano Estacado' is a barren plateau in the W., with a mean elevation of from 3000-5000 ft. The descent to 1000 ft. is swift, and then come the fertile tracts of rolling prairie, with plentiful forests of yellow pine in the E., and with fat pastures alternating with rich corn lands—tracts which extend terracewise to the fertile lowlands and barren swamps of the coastal belt. Behind Padre Is., which hugs the shore for over 100 m. northward from the mouth of the Rio Grande to that of the Nueces, is a region of white sands, known as 'the desert.' Sand bars block most of the

harbours. With the exception of the Red and Canadian, which carry their waters eastward to the Mississippi, all the rivers, including the Brazos, Colorado, and Trinity, drain south-eastward to the Gulf of Mexico. T. is one of the great granaries of the world, and one of the chief agricultural states of the Union. Its agricultural potentialities are indeed enormous, less than half the available arable land being under cultivation. It leads all the states in value of agricultural crops, these being worth over a billion dollars annually. Maize is by a long way the first grain crop, and after that come oats, wheat, and rice. Cotton is of great importance, T. producing from a fifth to a third of the world's supply. Other agricultural products are fruit (especially peaches, oranges, and grapefruit), potatoes, sweet potatoes, and other vegetables, peanuts, and sorghum. Stock-raising is of vital importance, T. being famed as one of the great cattle states. It raises nearly 16 million head of live-stock, including cattle, swine, sheep, horses, and goats. Petroleum is the most valuable mineral product, but the outputs of clay, coal, and Portland cement are also considerable. Lignite, sulphur, natural gas, quicksilver, and silver are also present, and in the W. are great potash fields, as yet unexploited. It produces over 99 per cent. of all the sulphur in the U.S.A. Slaughter-houses and meat-packing stores, and after them flour and grist mills, are the most profitable industrial establishments. But lumbering and timbering, cotton mills, and the manufacture of cotton-seed oil and cake are very thriving industries, whilst iron founding and the making of machinery and cars as well as rice cleaning are each year giving employment to more hands. It ranks only second to New York State in value of exports originating in the state. Much of the labour is done by Mexicans, some of the frontier towns having a population half Mexican. The state is too vast to enjoy a uniform climate. The 'northers,' or biting hurricanes, however, which suddenly spring up and lower the temperature perhaps 20° for as long as three days, are a striking feature. Moreover, the air in the W. is remarkable for its dryness. The capital is Austin, pop. 53,120. The other principal cities are Houston, 292,352; Dallas, 260,475; San Antonio, 231,542; Fort Worth, 163,447; El Paso, 102,421; Beaumont, 57,732; Galveston, 52,938; Waco, 52,848. The state has good harbour facilities, and, with over 1000 m. of navigable waterways, and 17,000 m. of rly., its communications are excellent. The

Houston Ship Canal, 30 m. long, connects Houston with the Gulf of Mexico, making that city the largest inland cotton market of the world. Galveston, the great cotton port of the U.S.A., is connected with the mainland by a causeway 2 m. long. T. state university is at Austin, and there are many other universities and colleges. The Spanish explorers De Vaca and Coronado (q.v.) were the first to traverse the region now known as T., but the first permanent settlement was made by La Salle in 1685 at Fort Saint Louis. T. was surrendered by the Fr. to the Spanish in 1713, who founded many religious missions. When Mexico revolted and became independent in 1821, Coahuila and T. formed one state. T. was colonised to a large extent by Americans and Eng., and trouble ensuing with the Mexican Gov., T. was constituted an independent republic in 1836. In 1845 it sought and gained admission as a state of the U.S.A. After the Mexican War, which was precipitated by this admission, T. prospered. In 1861 it seceded with the Southern States. The legislature consists of a Senate of 31 members, and a House of Representatives of 150. Two senators and 18 representatives attend Congress. Pop. (1930) 5,824,715. See D. G. Wooten, *A Comprehensive History of Texas, 1685-1897* (2 vols.), 1898; G. P. Garrison, *Texas, 1903*; F. W. Simonds, *The Geography of Texas, 1905*; W. B. Bizzell, *Rural Texas, 1924*.

Texel, one of the W. Frisian Is., belonging to the Netherlands. It is situated at the mouth of the Zuider Zee to the N. of Helder, from which it is separated by a channel 2 m. wide, and has an area of 71 sq. m. The northern end is called Eierland, or 'island of eggs,' in reference to the large number of sea-birds' eggs which are found there. It was joined to T. by a sand-dike in 1630, and is now undistinguishable from the main island. The island is a great fishing centre for small herring, flat fish, anchovies, and shrimps, and produces fine breeds of sheep and cattle. Other industries are agriculture and boat-building. Off T. the Eng. fleet under Monk defeated the Dutch under Van Tromp, who was killed in the action, 1653. Pop. 6800.

Textiles, see FABRICS, CLOTH MANUFACTURE AND FINISHING.

Tezcuco, or Tezcoco, a tn. in Mexico, situated near the Lake of Tezcuco. It is an old city and was originally the centre of the Aztec culture, some of its old buildings still remaining. Pop. 5464.

Tezeu, or Tezewo (formerly Dirschau), a tn. of Poland on the l. b. of the

Vistula, about 20 m. from Danzig. It has sugar factories and railway works. Pop. about 16,000.

Tezuitlan, a tn. in the state of Puebla, Mexico. Pop. 11,313.

Thackeray, William Makepeace (1811-63), an Eng. novelist, b. at Calcutta and sent to England in 1817. He was educated at the Charterhouse, London, and at Trinity College, Cambridge. After leaving the university he visited Weimar and Rome, and he entered the Middle Temple in 1831, but did not pursue his legal studies. From childhood he had scribbled verses and made rough drawings, in all of which his humour was apparent, and in 1833 he purchased and edited the *National Standard*, a weekly paper that was unsuccessful. Having spent his patrimony he now went to Paris to study art, and in 1836 published the amusing sketches *Flore et Zéphyr*, and became Paris correspondent of the daily newspaper, the *Constitutionnel*. When that paper died in 1837, he, having in the previous year married Isabella, daughter of Colonel Shawe, came to England and wrote for *Fraser's Magazine* and many other periodicals. The *Yellowplush Correspondence* appeared in *Fraser* (1837-38). His married life came to a close in 1840, owing to his wife's insanity. In that year he published *The Paris Sketch-book*, and this was followed by *Comic Tales and Sketches* (1841) and *The Irish Sketch-book* (1843). There had already appeared serially *The Great Hoggarty Diamond* (1841) and *Barry Lyndon* (1846), the latter one of his greatest works. He was, however, still unknown to the general public, and first obtained recognition by *The Snobs of England* (1846), which was printed in *Punch*, to which he had contributed regularly since 1842. *Mrs. Perkins' Ball* (1847), a 'Christmas book,' brought him further popularity, but he did not become famous until the publication of *Vanity Fair*, which was brought out in monthly parts (1847-48). This and *Pendennis* (1848-50) placed him in the front rank of living novelists. He lectured in London and the provinces on *The English Humorists of the Eighteenth Century* in 1851, and went to America to deliver the lectures there shortly after *Esmond* was written (1852). *The Newcomes* was published 1853-55, and while it was coming out *The Rose and the Ring*, a delightful extravaganza, appeared (1854). T. lectured on *The Four Georges* in America and England in 1855 and 1856, and in the following year unsuccessfully contested Oxford in the Liberal interest. *The Virginians* came out in 1857-59, and in 1860 T. became first editor of the *Cornhill*

Magazine, to which he contributed *Lovel the Widower* (1860), *The Adventures of Philip* (1861-62), and the delightful *Roundabout Papers* (1860-63). He resigned the editorship in 1862. At the time of his death, Christmas Eve, he was engaged upon *Denis Duval*, the fragment of which has been published (1864). T. is the lineal literary descendant of Henry Fielding, and is by many thought to be only second to him as an Eng. novelist. His plots are often indifferent, except in the case of *Esmond*, the plan of which was carefully prepared, but his humour and satire are excellent, and his gift of characterisation and his knowledge of life give virility to all his writings. His best works are *Vanity Fair*, *Pendennis*, *Esmond*, and *Barry Lyndon*, while the *Roundabout Papers* are in their way inimitable, and his light verse at its best is of remarkable quality. T. illustrated most of his own writings, and though it is urged that he lacked distinction as an artist, no one disputes his success as an illustrator. There are numerous collected editions of his works. The first (22 vols.) appeared in 1867-69. His daughter, Lady Ritchie, issued a biographical edition (13 vols.), 1898-99, and this, with additions, was reprinted as the Centenary Edition (26 vols.) in 1911. The most complete edition, with all the original illustrations, is that of Lewis Melville (20 vols.), 1901-07. There is a monograph on T. in the 'Great Writers' series by Herman Merivale and Sir Frank T. Mazials (1879), and a fuller biography by Lewis Melville (1899; 5th and much enlarged ed., with an elaborate bibliography, 1909). A valuable *Thackeray Dictionary*, by Mudge and Sears, was published in 1910. Consult Anthony Trollope, *Thackeray* (Eng. Men of Letters Series), 1879; *Letters of William Thackeray and Edward Fitzgerald*, 1913; E. B. Chancellor, *The London of Thackeray*, 1923; Anne Thackeray Ritchie, *Letters*, 1914 (edited by H. Ritchie); Sir A. T. Quiller-Couch, *Charles Dickens and other Victorians*, 1925.

Thaddæus, see JUDAS.

Thais, a celebrated Athenian courtesan, who accompanied Alexander the Great on his expedition into Asia.

Thales (c. 640 B.C.), the father of Gk. philosophy, and chief of the seven wise men, was a native of Miletus. He taught that water or moisture was the one element from which all things evolved. He appears to have owed much to the astronomy of the Egyptians and to the civilisation of Mesopotamia. He is regarded as the founder of abstract geometry, of the strict deductive form as shown in Euclid's collections; he is said to have

shown how to calculate the distance of a ship at sea, and the heights of objects. In astronomy he was credited by the ancients with the prediction of the total solar eclipse identified by Airy, Zech, and Hind with the date May 28, 585 B.C.; he is said to have noted the 'Lesser Bear' and to have shown its superiority for the purposes of navigation.

Thalia, one of the nine muses (*q.v.*).

Thallium, a metallic chemical element, symbol Tl, atomic number 81, atomic weight 204.2. It was discovered by Crookes (1861) in the seleniferous deposits from the sulphuric acid manufactory. It occurs in small quantities in iron pyrites, and also occurs associated with copper, silver, and selenium in the mineral 'crookesite.' The metal is prepared by displacement from its solutions by means of zinc. It forms a spongy mass which is fused beneath potassium cyanide. It is a soft, heavy metal (sp. gr., 11.9; melting point, 300° C.) which tarnishes in air, forming a film of thallous oxide, while on exposure to air and water thallous hydroxide (TlOH) forms slowly. This latter is soluble in water, the solution absorbing carbon dioxide rapidly to give thallous carbonate. Two oxides of the metal are known, Tl₂O and Tl₂O₃, from which are derived the thallous and thallic salts. Thallium compounds give a bright green line in the spectrum (hence the name, from Gk. *thallos*, a green twig); some of them find a use in the manufacture of optical glass.

Thames, *The*, a river, England, rises near Cirencester in the Cotswold Hills and follows a course of some 190 m. to Gravesend, the head of the estuary, where it has a width of half a mile, gradually increasing then to 10 m. at the Nore lightship about 30 m. further. By the addition of its tributaries the Colne, Leach, and Churn, it becomes navigable for barge traffic at Lechlade, where the canal to the Severn leaves. At Oxford the navigability improves, and the Wilts and Bucks Canal joins a few m. down at Abingdon, the Wye Canal leaving via the Kennet at Reading. From here barge and tug traffic, with important depôts at Reading and Kingston, is considerable, while river steamers ply between the latter place and Oxford. Tidal waters are reached a few miles further at Teddington, the first lock from the sea except for the tidal lock at Richmond. Until the Tower Bridge was built, London Bridge was the lowest in the course, and since the Tower Bridge opens to permit it ocean-going vessels still reach London Bridge, the part between the two

being known as the Pool. Gravesend, 20 m. lower, grew up at the spot where vessels awaited the turn of the tide. A little further the Medway, by virtue of its estuary the chief tributary, enters; just inside this is Chatham, the important naval depôt. Opposite to Gravesend and on the N. bank is Tilbury, the terminus of many large liners; the waters from here to the Nore lightship are of great strategic importance, hence there is here a station for destroyers, torpedo-boats, and gunboats. Sheerness and Shoreham as land defences add to this. From London Bridge downwards the river is lined with docks and wharves, the former being now under the Port of London Authority. At Woolwich, on the south bank, 8 m. below London Bridge, is the arsenal, and a little further up the river Greenwich with its Observatory. Historically, the T. is not surpassed in interest even by continental rivers. Partly because it was the main highway of Southern England, but mainly because it was the chief among a great number of closely-connected riv. basins, the T. Valley has in the past supported the gov. and the wealth of England. A slight rise surrounded by marsh on the left bank formed at the first point suitable for bridging a strategic site for London, the tide giving facilities to it as a port, while yet allowing the city to be built well up the river for defensive purposes. Still further up, a dominating site for the lower valley was found at Windsor for the mediæval kings. In Anglo-Saxon times the kingdoms were divided by the river, and the break in the Chiltern Hills at Goring was a check in the line of aggression. Eton, Oxford, Abingdon, Reading, Cricklade, Maidenhead, Medmenham, Godstow and Richmond are among the many places of especial historic interest. The T. in the remote past probably followed a course through a large plain, now the North Sea, where it joined the Rhine and Elbe, forming a mighty river embouching into the Norwegian Sea. See Hilaire Belloc, *The Historic Thames*, 1914; F. V. Morley, *River Thames*, 1926; and Salter's *Guide to the Thames*, 31st ed., 1929.

Thames and Severn Canal, leaves the Thames at Lechlade, and reaches Stroud, 30 m. N.E. The North Wilts Canal communicates with it at Cricklade, and the Stroudwater Canal from the Severn at Stroud. It runs through the counties of Wilts and Gloucester.

Thames Conservancy. The conservation of the Thames was granted to the Lord Mayor of London in 1487 and delegated to twelve Conservators in 1857, the powers being reconsti-

tuted in 1894. Prior to 1857 the duties relative to the lower part of the river devolved upon the Corporation of London, those relative to the upper part upon the Upper Thames Commissioners. The Port of London Authority (*q.v.*), by an Act of 1908, took over all rights and duties of the Conservators in respect of the river below Teddington. The Port of London's jurisdiction in the Thames, after embracing that of the T. C. in the lower riv., was extended from Teddington Lock to a line drawn from Warden Point to Havengore Creek, Essex. The Port of London Authority regulates navigation, etc., at this part of the riv.; but lighting and buoying duties and pilotage are the function of Trinity House (*q.v.*). The whole of the river above Teddington Lock towards its source is exclusively governed by the by-laws of the Thames Conservancy Board. The principal duties of the Board have to do with the preservation of the river from pollution, both in the main stream and in tributaries, docks, and canals, the protection of fisheries and the control of navigation.

Thammuz, see **TAMMUZ**.

Thana, see **TANNA**.

Thane, or **Thegn**, a title of honour in the Anglo-Saxon nobility. Originally the term was applied to the personal followers of the kings and signified a minister or honourable retainer. **Ts.** among other royal household officers were chosen to be advisers of the king as distinct from the general assembly of the *Witan*. Later the thegnhood developed into a powerful territorial nobility with royal grants of *Sac* and *Soc* (*i.e.* right to hold a court for one's tenants and the right to the amercements received from such court, respectively). The early institution of the thegnhood suggested to the Norman kings the military system based on the principle of homage, but apart from their connection with the fyrd or national array in times of emergency the **Ts.** did not hold their lands on condition of military service as did the tenants by *knight service*, but received them rather as a reward for past services.

Thanet, Isle of, a one-time island, now part of the mainland in the co. of Kent, Eng. At Ebbsfleet St. Augustine is supposed originally to have landed in 597, and in 449 Hengist and Horsa. Jutish sea pirates are supposed to have landed also. The pop. (1931) of the I. of T. (rural district) is 14,420; area, 18,639 acs.

Thanet Sands, the lowest division of the Eocene system (*q.v.*) and exposed in the London basin. They are well shown in the Isle of Thanet, and

have afforded many fossils, *e.g.* *Scalaria*, *Bowerbankii*, and *Pholadomya Koninckii*.

Thanksgiving Day, an annual festival of thanksgiving in the United States, now always celebrated, according to the choice of President Lincoln in 1864, on the last Thursday in November. It is in essence a national harvest celebration, and was first observed by the Pilgrim Fathers at Plymouth in 1621, after they had gathered in their first harvest.

Thann, a tn. in Alsace, France, in the dept. of Haut-Rhin. It has a Gothic church dating from the fourteenth century, and is engaged in manufacturing silk and cotton goods and machinery. Pop. 6623.

Thapsus, in anct. geography, a tn. in N. Africa, situated on the coast near the modern Cape Dimas in Tunis, 30 m. S.E. of Susa. It was here, in 46 B.C., that Julius Caesar utterly defeated the Pompeians under Cato, Scipio and Juba, and so ended the war in Africa (*consult* Livy, l. 29. c. 30).

Thar and Parkar, a dist. in the E. of Sindh, Bombay. It divides into two parts—the fertile plain of Nara and a dry region. Administrative headquarters are at Umarnkot. Pop. 457,000.

Tharawadi, a tn. and district of Lower Burma, in the Pegu division. The cap. is T., 68 m. N.W. of Rangoon. Area, 2851 sq. m. Pop. (district) 492,429 (1921); (town) 3625.

Thasos, or **Thasus**, an island in the N. of the Aegean Sea, off the coast of Thrace. It was early taken possession of by the Phoenicians, on account of its valuable gold mines. T. was afterwards colonised by the Parians, 708 B.C., and among the colonists was the poet Archilochus. The Thasians once possessed a considerable territory on the coast of Thrace, and were one of the richest and most powerful peoples in the N. of the Aegean. They were subdued by the Persians under Mardonius, and subsequently became part of the Athenian maritime empire. They revolted, however, from Athens in 465 B.C., and after sustaining a siege of three years, were subdued by Cimon in 463.

They again revolted from Athens in 411, and called in the Spartans, but the island was again restored to the Athenians by Thrasybulus in 407.

Thaton, a tn. of Lower Burma, in the Tenasserim district, formerly a seaport, and the capital of the Talaing kingdom—now about 10 m. from the sea. Pop. 14,400.

Thayer, Abbott H. (1849–1921), was b. in Boston, Massachusetts, U.S.A., and became a pupil in Paris of the famous J. L. Gerome. Returning to

his own country, he soon became prominent as a painter of landscapes, portraits, and animals. During the Great War he came to England to help in the development of camouflage, upon which he was somewhat of an authority, as he had been one of the first to call attention to the protective colouring of animals, nature's own way of camouflage from enemies.

Thayet-myo, the cap. of the dist. of T., Lower Burma, on the Irawadi. The chief products are rice, cotton, and oil-seeds. Pop. 11,600.

Theatre. The theatre is an almost wholly commercialised art in Great Britain and America. There are a few theatres conducted by enthusiasts for the sake of acting and the drama, but there is no State support of the theatre, and no theatres independent of commerce. The semi-commercial theatres in London are the Old Vic and Sadler's Wells, the Gate Theatre Studio, and in the provs. the Repertory Theatres (*q.v.*). In America the New York Theatre Guild is an example of semi-commercial theatrical enterprise. The only completely non-commercial theatre is that provided by amateurs, which will be referred to later. On the continent of Europe there still exist famous theatres (in Paris, Vienna, Budapest, Berlin, Copenhagen, etc.) which are partly or wholly controlled by the State or municipality and depend on public funds. But outside these few theatres the theatrical 'industry' in these countries is in the same state as it is elsewhere. The exception is Soviet Russia, where the theatre is communised, as is everything else. The theatre is thus affected by the conditions that apply to commerce generally in the present day and shows similar tendencies. The small man is superseded by the large man, considerable capital resources are required, and theatrical activities are centralised. In every country the theatre depends upon the metropolis, comes from the metropolis, and has little existence outside of it. The theatre's backers and the speculators who engage in the industry confine their attention to the metropolis, for it is there that most money is to be made. It would not be true to say that no work of artistic value is done even under such conditions, for many actors and dramatists, and some theatrical *entrepreneurs*, pay attention to art. But artistic endeavour is necessarily, in the circumstances, subordinated to commercial requirements, with the results that are well known. **National Theatre.**—There is a movement for a National Theatre in England, inspired largely by the desire for a theatre devoted wholly to

art. That movement is increasing in public support, and is ultimately likely to achieve its aims. The capital sum of one million pounds is estimated to be required for the purpose. **The Producer.**—An important feature of the theatre has been the development during the past twenty-five years of the function of the 'producer.' To-day almost every play is 'produced' by someone who is not its author, or who may not be acting in the play, nor be otherwise responsible for it. The producer is the artistic director of the play, standing in much the same relation to the play as a conductor does to an orchestra. The producer is responsible for the working out of the play on the stage, controlling its acting, and the scenery, properties, costumes, etc. He is responsible for the play as a whole. The best work is done by a producer when he works constantly with the same company; but this is hardly ever seen, as it is the custom of theatrical managers and *entrepreneurs* to engage actors and a producer for each separate play. **Tendencies.**—The tendency in the theatre since 1919 has been for elaboration in production, and for giving attention to scenery, stage decoration, and mechanical appliances. This tendency is still (1932) marked; but there are signs of a return to the play and acting as the main elements in the theatre. **Amateurs.**—The amateur theatrical movement has had a remarkable development in both England and America since 1919. More than half a million people of all classes are estimated to be actively interested in the movement in Great Britain. The object of the amateurs is (a) to take part in the art of the theatre either as actors, designers or producers; and (b) to enable audiences that would not otherwise see them to witness good plays. Some amateur companies have professional producers, as at the Maddermarket Theatre, Norwich, and several of them have their own theatres, as at Leicester, Hull, Halifax, Bournemouth, etc. A feature of the movement is the extent to which it has spread in the villages throughout the whole country, and nowhere more than in Scotland. The National Festival of Community Drama founded in 1926 is nationally organised by the British Drama League for the performance of one-act plays. The final Festival is held annually in London, when the Lord Howard de Walden cup is awarded for the best performance of the year. In the United States amateurs constitute the Little Theatre Movement, which is wide-

spread throughout the continent, and in many places work of a high quality is done. Competitions somewhat on the lines of the British Festival are held in a number of centres, including New York. See also DRAMA for a historical account of the drama, actors and acting. Consult Memoirs and Autobiographies of Actors; Gordon Craig, *The Art of the Theatre*, 1905; *Towards a New Theatre*, 1912; Henry Irving, 1930; H. Granville-Barker, *The National Theatre*, 1930; C. B. Purdom, *Producing Plays*, 1929; also the Bibliography in A. Nicoll's *The Development of the Theatre*, 1927.

Théâtre Français, see COMÉDIE FRANÇAISE.

Theatres, Laws Relating to. By the Theatres Act, 1843, all theatres for the 'performance of stage-plays' must be licensed. Stage-play by section 23 includes 'every tragedy, comedy, farce, opera, burletta, interlude, melodrama, pantomime, or other entertainment of the stage.' 'But,' says Mr. Strong (*Dramatic and Musical Law*), 'it required no less a person than "Pepper's ghost" to appear in a court of justice in order to get a decision of this definition.' A *ballet divertissement* which merely 'consists of poses and evolutions by a number of elegant ladies' is not, but a *ballet d'action*, which usually has in it the shadow of a regular dramatic story, is, a 'stage play' for the purposes of licensing law. The Lord Chamberlain is the licensing authority as to all theatres (except patent theatres, the only existing example of which is Covent Garden) within the parliamentary boundaries of London and Westminster, and in the boroughs of Finsbury, Marylebone, Tower Hamlets, Lambeth, Southwark, New Windsor, and Brighton. In county boroughs the licences are granted by the town councils, in non-county boroughs by the county council, while the L.C.C. is the authority for those parts of London which are not within the jurisdiction of the Lord Chamberlain. A licence will be granted to the manager of the theatre only. (As to licensing of plays, see CENSORSHIP OF THE DRAMA.) *Keeping* a 'theatre' without a licence entails a penalty of £20 for every day; *representing* for hire a stage play in an unlicensed place, a daily penalty of £10; *performing* in public a new play without the leave of the censor, £50, and avoidance of the theatre licence. In regard to structural requirements for the prevention of fire, the L.C.C. has power under the London County Council (General Powers) Act, 1915, to revoke music and dancing licences if the terms or conditions on which

they were granted are contravened, and under a similarly entitled Act of 1923, the Council may vary the conditions attached to licences for stage plays granted by it under the provisions of the Disorderly Houses Act, 1751, the Cinematograph Act, 1909, or any amending Act. The enforcement of fire regulations is also provided for under the London County Council (General Powers) Act, 1923, and, in the metropolis, the Council can close theatres for breach of the regulations. Provision is now made for compulsory registration of theatrical employers under the Theatrical Employers Registration Act, 1925, the object of which Act is to prevent persons of no substance from engaging companies and then abandoning them or failing to pay their salaries. All theatrical employers must hold a certificate of registration issued by the appropriate authority, which is the county or borough council or, for the metropolis, the common council. The Act does not apply to an employer or his agent having a licence under the Theatres Act, 1843, or a music and dancing licence; or to persons who employ for charitable performances, and not for gain or by way of business. By an amending Act of 1928 the registration authority can institute and prosecute proceedings against and oppose applications by persons whose certificates have been cancelled; and they can also refuse, cancel, or suspend the registration of a person who has been convicted of an offence involving dishonesty. Places licensed for music and dancing are exempt from the provisions of these two Acts. Restrictions are imposed by the Education Act, 1921, on children taking part in entertainments, and the Children (Employment Abroad) Act, 1913, prohibits or restricts the taking of children or young persons out of the United Kingdom with a view to their singing, playing, performing, or being exhibited for profit. The earlier law on the employment of children on the stage is to be found in the Children Act, 1908 (*q.v.*). The proper course where it is proposed to put a child on the stage is to obtain the leave of a magistrate. In Scotland, where the fitness of a child for training is proved, the petty sessional court will grant a licence allowing it to be trained for the stage, provided the court is satisfied that provision has been made to secure kind treatment. Dramatic and musical performances are protected by the Musical Performers' Protection Act, which prohibits unauthorised persons from making records (*i.e.* any mechanical contrivance for reproducing by sound) of any such per-

formances; but it is a good defence to prove that the record was not made for purposes of trade. See also MUSIC AND DANCING LICENCES.

Thebaine ($C_{10}H_{11}NO_2$), one of the alkaloids contained in opium in combination with meconic acid. It is very poisonous, causing severe convulsions. It gives a blood-red coloration with concentrated sulphuric acid.

Thebes: (Gk. $\Theta\eta\beta\alpha\iota$, Heb. *No-Amom*). (1) The name of an anct. city of Upper Egypt, which was then known as Thebais. It survives to-day in the splendid array of ruins at Karnak and Luxor. T. was founded in remote antiquity, probably under the 1st dynasty, and sprang into prominence in the 11th dynasty. The city consisted of two main portions, separated by the Nile, each part extending from the bank of the river to the base of the hills which envelop the valley of the Nile. Its site is now marked by the villages of Luxor and Karnak on the eastern side and by Gournou and Medinet-Abu on the western. Its most flourishing period appears to have been about 1600 B.C., when it was the capital of all Egypt. Its circumference was estimated by Diodorus Siculus to be about 17 m. It was the residence for several centuries of Egyptian kings, whose tombs have since been discovered. During the reigns of the Ptolemies T. was neglected and Memphis became the capital. In 525 B.C. T. was partly burned by the Persians under Cambyses, and in 86 B.C. it was captured and plundered by the Gks. The buildings and sculptures still extant are the most anct. and the best specimens of Egyptian art and architecture. For a description of the monuments that remain, consult Baedeker's *Egypt*, and works by Flinders Petrie (1897) and Naville (1894-1906). (2) The chief city of Boeotia in anct. Greece. Its position was well defended, since it was situated in the middle of a plain surrounded by mountains. We find our first historical trace of the city in the conquest by the Boeotians about the year 1100 B.C. T. then became the chief city of a confederation. Later we find the city in contest with Athens, and later supporting Persia against her invaders. She became the closest ally of the Spartans, and during the Peloponnesian War was Athens' bitterest foe. At the close of the war, however, she allied with Athens against Sparta, but the city was conquered and garrisoned by the Spartans. After the Battle of Leuctra (371 B.C.) for a short time she became, under Epaminondas, the most powerful state in Greece. She was defeated and captured by the Macc-

donians, and utterly destroyed by Alexander the Great (335 B.C.). The town was restored about 315 B.C., but never again rose to occupy a position of importance. Pop. (1928) 7113.

Thecla, a virgin saint of the early church. She was a member of a noble family of Iconium in Lycaonia, where she was converted by the preaching of St. Paul. She suffered many persecutions, and is styled in the Gk. martyrologies the *proto-martyress*, as Stephen is the proto-martyr. She is said to have *d.* at the age of ninety in Seleucia.

Theft. In most communities, anct. and modern, the institution of private property has occasioned the formulation of copious laws for the redress of violations by T. of the exclusive rights of ownership. But in an age of ungoverned violence, when legislators or law-givers had not as yet attained to the conception of the preservation of public order for its own sake, the legal code of an anct. state reflected a very different view of the moral aspect of stealing from the modern view, or even from that of the earliest Christianised communities. Maine asserts with a great show of probability that the anct. Rom. and Gk. codes had no real law of crimes at all, and that such penal laws as they do reveal are no more than the law of wrongs or torts (see TORT). The first *civil* wrong recognised by the Twelve Tables was that of *furtum* (T.), and even assaults and violent robbery were no more than *delicts* (torts). All such wrongs gave rise to an *obligation* or *vinculum juris*, the fulfilment of which was considered complete with the payment of money. T. is defined in the *Institutes* of Justinian as 'the fraudulent dealing (*contrectatio rei fraudulosa*) with a thing itself, or with its use, or its possession; an act which is prohibited by natural law.' This definition affords some striking points of resemblance to most modern definitions of stealing (*cf.* that of larceny in Eng. law, under LARCENY); *e.g.* the word *contrectatio* imparts the notion of touching or handling (see TRESPASS), while *fraudulosa* indicates that to constitute T. the thing must be seized with evil intent. The *Digest*, according to some authorities, adds, after '*fraudulosa*,' *lucri faciendi gratia* (with the object of profiting by the act); but some civilians regard that extension as apocryphal, and it is almost certain that the idea of gain was not implicit in the Rom. definition of T., and that the taking of another's goods out of mere spite or to destroy them was enough. This assumption seems warranted by a later passage in the *Institutes* which

provides that it is T. 'not only when anyone takes away a thing belonging to another, in order to appropriate it, but generally when anyone deals with the property of another contrary to the wishes of its owner. Thus . . . if anyone borrows a horse as for a ride, and takes it . . . into battle.' Though, whether by reason of the influence of Christian ideas or the attainment of a more subtle analysis of motive, the text continues: 'A person, however, who borrows a thing and applies it to a purpose other than that for which it was lent, only commits T. if he knows he is acting against the wishes of the owner, . . . for there is no T. without the intention to commit T.' In England, the doctrine of the King's Peace was the foundation of T. as a public wrong; on the Continent it is to be traced to the source of *Naturrecht* or Natural Law (see JURISPRUDENCE), the first effect of which upon T. is to be found in the Rom. Institutes, which characterise *furtum* as an act prohibited by natural law. (See also JUS GENTIUM.) The Anglo-Saxon laws of Ina, Athelstan, and others respecting the punishment of T. reveal a curious compromise between the Draconian severity of a pagan state and the mildness inculcated by the Christian missions from Rome; death was nominally the punishment in cases of T. where the value of the article taken exceeded 12d.; but in practice the thief could always compound his offence by a fine. Up to comparatively recent times, however, felonious T. remained a capital offence (see CAPITAL PUNISHMENT). At the present time T. connotes a variety of cognate but distinct offences, varying from larceny (*q.v.*) to fraudulent breach of trust. In this connection it is instructive to recall with Maine the erroneous inference drawn by many from the fact that the only form of dishonesty treated of in the most ant. Rom. law is T. (meaning thereby larceny). See also BURGLARY, EMBEZZLEMENT, FRAUD and LARCENY.

Theine, see CAFFEINE.

Theism, see DEISM.

Theiss (Hungarian *Tisza*), the most important Hungarian riv., rises in two head-streams on the slopes of the Carpathians, where it is known as the White T. and the Black T. It takes a winding course, generally in a W. or S.W. direction, to empty its waters into the Danube near Titel, after receiving the Szamos, Maros, Körös, Sajó, and Latorcza. Length 820 m.

Themis, in Gk. mythology, was the daughter of Uranus and Gæa, and by Zeus the mother of Eunomia, Dike, and Eirene.

Themistius (c. A.D. 317-387), an Oriental philosopher and rhetorician, was a native of Paphlagonia. He settled in Constantinople about 347, where he became a senator (355) and prefect (384). He wrote paraphrases of various works of Aristotle. The *editio princeps* is that of Aldus (Venice, 1534). See editions of Dindorf (1832) and Spengel (1866), and Baret's *De Themistio Sophista* (1853).

Themistocles (c. 514-449 B.C.), an Athenian soldier and statesman, son of one Neocles. Little is known of his early life, but he was ambitious from childhood, and in his unscrupulousness differed from his rival, Aristides, who was ostracised in 482. T. advocated naval expenditure to protect Athens from Persian invasion, and through his influence 100 new triremes were constructed and the port moved from Phaleron to Piræus. During 493-492, the years of his archonship, T. was the first man in the state, and for the next ten years exercised almost unlimited power. Though the Spartan Eurybiades was nominally in command of the navy, it was T. who forced the engagement at Artemisium to take place. Seeing that Eurybiades was wavering and unwilling to fight, T. sent a message to Xerxes that unless he attacked at once the Gks. would make good their escape. The Persians, accordingly, blocked the western exit of the bay with 200 ships, so that a battle was inevitable, and the glory of the Battle of Salamis (483) fell to T. On the retirement of the Persians, he rebuilt the walls of Athens and strengthened the fortress and harbour of Piræus, throwing dust in the eyes of Sparta until the work was practically completed. He also removed the *metoikion*, an alien's tax, and thus encouraged many foreign traders to settle in Athens. He soon appears to have lost his influence with the Athenians, probably on account of his arrogant manners, and about 471 was ostracised and banished from Athens. He retired to Argos, where he was falsely accused of treason, and then fled to Corcyra, and finally was welcomed by Artaxerxes. He settled in Magnesia, where he lived till his death. See Lives by Plutarch and Cornelius Nepos, monograph by Bauer (1881), and Grote's *History of Greece*.

Thénard, Louis Jacques, Baron de (1777-1857), a Fr. chemist, studied under Fourcroy and Nauquelin. He was professor of chemistry at the Collège de France (1804), and at the Ecole Polytechnique and Faculté des Sciences (1810). T. improved the process of manufacturing white lead. His works include: *Traité de Chimie élémentaire, théorique et pratique*,

1813-16 (6th ed., 1836); *Recherches physico-chimiques* (with Gay-Lussac), 1811.

Theobald, Lewis (1688-1744), an editor of Shakespeare, and translator. He had a first place in the *Dunciad* for his criticism of Pope's edition. T. produced in 1734 an edition of Shakespeare which gave him a high place among Shakespeare's editors.

Theocracy (Gk. *θεοκρατία*, government by God), a term applied to the constitution of the Israelitish government as established by Moses, on account of its being under the direct control of Jehovah.

Theocritus, the bucolic poet, was a native of Syracuse, and the son of Praxagoras and Philinna. He visited Alexandria during the latter end of the reign of Ptolemy Soter, where he received the instruction of Philetas and Asclepiades. His first poems, in 285 B.C., obtained for him the patronage of Ptolemy Philadelphus, in whose praise the poet wrote the 14th, 15th, and 17th Idylls. T. was the creator of bucolic poetry as a branch of Gk., and, through imitators such as Virgil, of Rom. literature. The bucolic idylls of T. are of a dramatic and mimetic character, and are pictures of the ordinary life of the common people of Sicily. See Fritzsche (with Latin notes), Kynaston, and Cholmeley. Translations: Andrew Lang (prose); Calverley, *The Idylls* (verse). See also Symonds, *The Greek Poets*, chap. xxi. The text, ed. U. de Wilamowitz-Möllendorff, is contained in *Bucolici Græci*, 1905, and text with translation (by J. M. Edmonds) in the Loeb Library (*Greek Bucolic Poets*). The Oxford ed. of the Gk. text, ed. Wilamowitz-Möllendorff, was pub. 1909.

Theodectes (c. 376-335 B.C.), a Gk. orator and tragic poet b. at Phaselis. His father, Aristander, caused him to study under Plato, Isocrates, and possibly Aristotle, who dedicated to him one of his treatises of rhetoric. He also wrote several orations and poems on the art of oratory.

Theodolite, the most important of the instruments used in surveying, by which the measurement of angles, vertical, but especially horizontal, is performed. It consists of a telescope mounted so as to move on two graduated circles, one of which is horizontal, and the other vertical. The axes of the telescope pass through the centres of these two circles. The instrument is carefully adjusted on a pedestal which when in use stands upon a tripod stand. An elaborate arrangement of screws and plates enables the T. to be adjusted with almost perfect accuracy. Though the

T. can measure both vertical and horizontal angles, the latter only can be measured with perfect accuracy. For the measurement of vertical angles a levelling instrument is more accurate. There are three main types of T.—the Everest, the Y-pattern, and the transit—but the differences between them do not essentially affect the construction. It is important to notice a change that has been made in graduating Ts. Until recently, British Ts. were divided into degrees, of which 360 made the complete circle, but they are now frequently made with the Fr. centesimal graduation in which the circle is divided into 400 divisions. See SURVEYING AND LEVELLING.

Theodora (c. A.D. 508-548), wife of the Byzantine emperor Justinian, notorious before her marriage as an actress and dancer of ill-repute, was proclaimed empress in 527. She showed high courage in the Nika insurrection (532), and was an able counsellor in all matters of state.

Theodore (1690-1756), 'King of Corsica,' Baron de Neuhoft, b. at Metz. Early left an orphan, he served France and Sweden as a soldier, and helped in a plot to re-establish the Stuarts in England, but his plot was discovered, and he had to flee. Marrying an Eng. wife, he stole her jewels and deserted her. He entered the service of Charles VI., Emperor of the Holy Roman Empire, who appointed him resident at Florence. He headed a Corsican rising (1738), and was proclaimed as King Theodore I. His short period of gov. was able and energetic. Deposed by the Genoese (1738), he came to London, where he died.

Theodore of Abyssinia, see ABYSSINIA.

Theodore of Mopsuestia (c. 350-428), a learned bishop and biblical scholar of the Eastern Church, b. at Antioch. He was the leader of the Antiochene or literal school of exegesis. See editions of his extant works by Fritzsche (1847), Swete (1880-82), Mai (1832 and 1854), and Sachau (1869).

Theodoretus, or **Theodoritus** (c. A.D. 393-457), was brought up under the care of a pious mother, and had instruction from Theodore of Mopsuestia and John Chrysostom in a monastery. T. became a deacon in the church at Antioch, and in 423 was chosen Bishop of Cyrus, a city in Syria. Against the opinions of the heretics he directed his efforts with so much success that, according to his own statement, he baptised 10,000 Marcionites. In 431, when Nestorius was condemned by the Council of Ephesus (see NESTORIANS), T. was one of those who assembled and con-

demned its proceedings. He warmly protested when John, Patriarch of Antioch, gave his consent to the condemnation of Nestorius. In 449 T. was deposed from his bishopric, and he was compelled to retire into the monastery where he had been educated. In 451, however, an oecumenical council was assembled, to which T. was summoned. By condemning Nestorius he was restored to his bishopric. His works were: *A History of the Church from 329 to 429*; *Φιλόθεος ἱστορία*; *Ten Orations against the Heathen*; an *Apology for Christianity*; besides 146 letters and commentaries on books of the O.T. and on the epistles of St. Paul; and some others.

Theodoric (or Theoderic) I., King of the Visigoths (A.D. 418-51), and son of Alaric. He succeeded Wallia, and warred against the Romans from 425-40, defeating them at Toulouse (439), soon afterwards concluding peace with them. Then, uniting with Ætius, the Rom. general, against Attila the Hun (450), he fell in battle at Châlons-sur-Marne. *Theodoric II.*, his second son, became King of the Visigoths (452-66), after murdering the elder Thorismund, and ruled over most of Spain and Gaul. He was assassinated by his brother Euric.

Theodoric the Great (A.D. 455-526), founder of the Ostrogothic monarchy in Italy. As a child he was a hostage at Constantinople, and soon after his return to his father, Theudemir, attacked the king of the Sarmatians and captured Singidunum (Belgrade). Theudemir and his son now successfully invaded Mœsia and Macedonia, and on Theudemir's death (c. 474), T., after some raids against the Emperor Zeno and a rival Gothic chieftain, set out to win Italy from Odoacer, whom he defeated at Verona. The conquest was delayed by treachery, and Ravenna, whither Odoacer had fled, was besieged. At last there was a capitulation, which T. violated by slaying Odoacer (493). T.'s thirty-three years' reign was a period of peace and prosperity for Italy. He maintained his traditional Arian creed, but was impartial in religious matters. He figures in the Nibelungenlied, being known to the Gers. as Dietrich von Berne (Verona).

Theodosius, an able Rom. general of the reign of Valentinian I. He fought against the barbarians of Britain and Germany (367), and crushed a Moorish insurrection in Africa (373). The reason of his execution at Carthage (376) is unknown. His son was the Emperor Theodosius the Great.

Theodosius I., Flavius, the Great (b. c. A.D. 346), a Rom. soldier, b. in Spain, son of General T. (d. 376).

He became Rom. emperor of the East (c. 373-95). T. entered the Christian Church, and was noted for his zeal against the Arians. He warred successfully against the Goths, concluding peace with them (382). With them as allies and with the Huns, he defeated (383-88) the usurper Maximus, who had laid claim to Gratian's empire, and secured the throne of the West for Gratian's brother, Valentinian II. After the latter's death (392) T. became sole emperor (394). The cruel massacre by means of which he avenged the riot at Thessalonica (390) has branded his name with infamy. St. Ambrose, Archbishop of Milan, insisted on public penance before allowing him to participate in church services. T. divided his empire between his sons, Honorius and Arcadius, the former ruling the West, the latter the East. See Fléchier, *Hist. de Théodose le Grand*, 1679; Hodgkin's *Dynasty of Theodosius*, 1889.

Theodosius II. (401-50), grandson of T. the Great, and son of Arcadius, succeeding him as emperor of the East (408). His sister, Pulcheria, and the prætorian prefect, Anthemius, ruled during his minority. Wars with the Persians (421-41) and the Huns under Attila (441-48) were among the chief events of his reign. The *Codex Theodosianus*, a collection of Imperial Constitutions in 16 books, was published in 438. See Gerlach, *De Theodosio Juniore*, 1751; Güldenpenning, *Gesch. des oströmischen Reiches unter Arkadius und Theodosius II.*, 1885; Mommsen and Meyer, *Theodosii Libri XVI.*, 1904-05.

Theognis of Megara (b. c. 540 B.C.), an elegiac and gnomic poet, was by birth a noble. He was deprived of all his property and shared the exile of the oligarchical party. The greater part of his poems were composed during his period of exile. He is the best preserved of the Gk. elegists, and owes his fame chiefly to his 'maxims.' See Introduction to Prof. H. Williams's ed., 1910.

Theogony (Gk. *θεός*, god; *γόνος*, seed), a genealogy of the gods. Many early Gk. poets wrote verse theogonies, of which only one, that of Hesiod, is extant.

Theology (Lat. *theologia*, from Gk. *θεολόγια*, 'speaking concerning God'), a term widely, but somewhat inaccurately, used as equivalent to religion. T. is the science of religion, dealing therefore with God, and man in his relations to God. The term may be still further restricted to mean systematic T., in which department it deals with the specific doctrines, principles, and characteristics of Christianity alone. T. is treated

under two main heads: Natural and Revealed T., and until the last century it was usual to keep the two subjects strictly apart. Various causes, chief of which is the application of the theory of evolution to religion and T., have conspired to do away with hard and fast divisions of this kind. Modern thought, in T. as elsewhere, strives to minimise the importance or deny the existence of critical points in the world's history, and to trace instead an orderly development. It is evident that, without an entire break with historic Christianity, no such change can take place with regard to dogmatic T. Here, however, the influences have taken the shape of a tendency to somewhat drastic restatement. Restatement is, of course, no new thing in T.; it is, indeed, necessary to its existence as a science. Moreover, though its working is on different lines, it is doubtful whether the modern restatement is any more complete than that which culminated in the *Summa Theologica* of Aquinas. By the comparison of this great work with the book *Foundations*, published in 1912 by Seven Oxford Men, some idea of the nature of the change that has taken place may easily be gathered.

There is a very close affinity between T. and philosophy. Since philosophy seeks continually to perceive truth, thereby gaining knowledge, so in matters of T. it seeks to know God. It may at first appear that T. is so much a question of faith that investigation of it along the lines of reason must be beset with difficulty. But while philosophers claim that religion is in no way opposed to reason and that the study of faith as a human experience lies within the limits of legitimate knowledge, theologians apply themselves to the doctrinal content of such faith. According to Hegel, a leader of the rational school, religious knowledge is composed of doctrines based first upon the dictates of reason through actual experience, and then by deduction after examination of such experience. The process is held to lead to such an orderly series of progressive stages that dogmatists are inclined to criticise the rational conclusion as falling short of the limitless scope of their spiritual Godhead, protesting that He is beyond the possibilities of attempted comprehension by human intellect: that, in brief, He is so boundless as to be accepted without any question of proof according to the confines of the human mind. Moreover, Catholic T. of all ages professes to be based upon a divine revelation from without the human mind. Rationalists are also attacked

by those philosophers who form the empirical school, not as any protest against the attempt by the rationalists to compass understanding of God with human understanding, but rather that rationalism makes it possible for there to be other systems of deistic beings, a postulation that they strenuously deny. Both Locke and Butler are of this school, who base their T. upon human experience as a means of revealing God's will, and who refute the possibility of there being any soul other than God's of which the human soul is a part. The dogmatists, who form what may be termed the parent body of theologians, accept without question the fact of God's existence. Every act of man which leads him towards God is regarded not as upon man's initiative, but upon God's. And God by such acts of man is expressing this Divine Will in a progressive process of revelation to him. Dogmatists are therefore metaphysical, and this is particularly noticeable in their presentation of the theory of Christ and His Incarnation. Many hold that Christ's divinity was certain: the Alexandrian School emphatically did so from a Platonic standpoint. The Antioch School, however, while professing Christ's divinity, sought to discard the allegorical interpretation of the Incarnation, and approached the subject from an empirical direction. Of the two schools, that of Alexandria has proved the more popular throughout history. The question of Christ's divinity and His identification in the Trinity has not been decided even to-day outside the Rom. Catholic and Orthodox Churches. Unitarians disregard his divinity, indeed, deny it, thus disposing of the difficulty, but among Trinitarians there are differences of opinion as to whether Christ is God in another manifestation, or a part of Him as a divine emissary. An aspect of theological study which is becoming prominent to-day is the relationship between religion and the state. Nietzsche has already indicated the direction along which such a line of inquiry may be made. In his *Joyful Wisdom* he says, 'the church is under all circumstances a nobler institution than the state.' In the article on SOCIAL ANTHROPOLOGY (q.v.) it is seen that there is a vital force impelling every forward movement in social development. And that this urging force is a spiritual one is proclaimed by Lamarck in his writings upon a teleological doctrine of progress, utterances which are to be found in his works on the philosophy of religion. More modern writers have published their convictions that there is pos-

sibly a new religious interpretation of reality. Professor Julian Huxley writes upon this theme in *Religion Without Revelation*, and in his *Progress and Religion* Christopher Dawson has with power and illumination covered the ground pointed out by Nietzsche. Consult Bethune-Baker, *Introduction to the Early History of the Christian Doctrine*, 1921; Singer, *Religion and Science*, 1927; Tennant, *Philosophical Theology*, 1928; Caird, *Evolution of Theology in the Greek Philosophers*, 1904; Dawson, *Progress and Religion*, 1927; J. Huxley, *Religion Without Revelation*, 1927; see also NATURAL THEOLOGY.

Theophrastus (c. 372-287 B.C.), a Gk. philosopher, b. at Eresos in Lesbos. He was the pupil of Plato and Aristotle in Athens, and on the death of the latter became head of the Peripatetic school, which drew large numbers of pupils from all parts. He was a close follower of the Aristotelian philosophy, giving his attention especially to natural history and to botany. His chief works include treatises on politics, legislators, laws, metaphysics, the senses and the imagination, oratory, poetry, and plants. His *Ethical Characters* are depictions of moral types and were the model for later character writers. Eng. trans. by Jebb was pub. in 1870. The Oxford Classical Text of the *Characters*, ed. H. Diels, was pub. 1910. The text and trans. (by Sir A. F. Hort) of *The Enquiry into Plants* is in the Loeb Library.

Theopompus of Chios (b. c. 378 B.C.), a Gk. historian, studied rhetoric under Isocrates at Chios. He shared the exile which his father had incurred by espousing the Lacedæmonian cause, but was restored to his country in 333 B.C. He then took a leading part in politics on the aristocratic side, and raised a host of enemies, among whom was the sophist Theocritus. About 305 B.C. he was expelled from Chios and fled to Egypt. Nothing is known of his further fate. T. composed histories and orations, but none of his works is extant.

Theorbo, a musical instrument, resembling a lute, now extinct, was used as an accompaniment to the voice. It had two heads or nuts, with the upper and middle strings attached to the lower head, and the base strings to the upper one.

Theorem (Gk. *θεώρημα*, something to be looked at or seen), in mathematics, any proposition which states its conclusion, or makes some affirmation or negation requiring proof, whereas a problem states something which is to be done.

Theory, properly speaking, the mode of making seen and known the

dependence of truths upon one another. When thus understood, it is at once evident that the opposition frequently made between facts and Ts. is an incorrect one. The T. is merely the co-ordination and interpretation of facts, based on them and in a way containing them. An opposition, however, has really arisen in many cases because so few Ts. are perfect. A perfect T. harmonises with all the facts and completely fulfils its work. An imperfect T. is always inadequate, and is often definitely wrong. Hence it is that the common distinction between fact and T. has arisen. In another sense a distinction is made between T. and practice, but here again the distinction is largely due to the prevalence of imperfect Ts. Those who are anxious to make this distinction understand by practice the application of that knowledge which comes from experience only, and is not sufficiently connected with any general principles to be entitled to the name of a T. But the distinction between theoretical and practical labourers in the field of science or art is not strictly a just one, for there is no theorist whose knowledge is all T., and there is no practical man whose skill is all derived from experience. Regarding, however, the higher class of men to whom one would apply the terms theoretical and practical, one sees that there are obvious faults to which both parties are subject.

Theosophy, meaning divine wisdom, dates from a very high antiquity, coming down to us from the Neoplatonists, Plotinus, Iamblichus, and Proclus. Numbered among theosophists also are Paracelsus, Boehme, and the Rosicrucians. In the East also T. is of very ancient origin, the Sanskrit equivalent being *Brahma-Vidyā*, or divine knowledge. It is closely allied to mysticism, and involves a belief in one absolute, incomprehensible, and supreme deity, who is the root of all nature, and of all that is visible and invisible, a belief in man's eternal nature, which, being a radiation of the universal soul, is of an identical essence with it, and a belief that by returning to the purity of nature one can gain certain occult powers. T. has always had as an aim the reconciliation of all religions and nations under a common system of ethics. Helena Petrovna Blavatsky (q.v.) (1831-91), a Russian princess, who it is claimed was initiated in Tibet, is the recognised founder of the two great branches of to-day. T. is supposed to be preserved by initiates scattered over the world who have attained spiritual perfection, but elect to watch over the religion. A

group of these Arhats, Mahâtmas, or Masters, it is said, led H. P. Blavatsky to found the Theosophical Society in 1875. Its teachings in general may be said to be founded on the two great principles of *Karma*—which in Christian terminology would mean 'Whatsoever a man sows that shall he also reap'—and *Reincarnation*, or the belief that man must undergo a series of lives until he has assimilated all the soul experiences and can attain to Nirvâna. The terminology and the thoughts seem to the Westerner to be Buddhistic, but it is claimed that T. is not Buddhism. After H. P. Blavatsky died, W. G. Judge, of America, became the leader, and upon his death the society split into two sections, one following Mrs. Katherine Tingley, and the other Mrs. Annie Besant. See H. P. Blavatsky, *The Key to Theosophy*, *Isis Unveiled*, *The Secret Doctrine*. See also KRISHNAMURTI.

Theotocopuli, Domenico, called *El Greco* (c. 1545–1614), Græco-Spanish painter, b. in Candia, Crete. Studied in Venice—perhaps under Titian. He was in Rome 1570–c. 1576, and migrated to Toledo about 1576. In that city, where he lived the rest of his life, he painted for the cathedral—especially 'El Espolio' (the Stripping—i.e. of Christ), 1579; over which there was a lawsuit. His 'Martyrdom of St. Maurice,' painted for Philip II., also failed to please its recipient. His masterpiece, 'The Burial of Count Orgaz,' was painted, probably in 1587, for the church of S. Tomé, Toledo. T. was also an architect and sculptor. He constructed and decorated the church and monastery of the Bernardine monks at San Domenico di Silvos, and designed the church of the Augustines at Madrid. He d. April 7. Many of his portrait-paintings are in the Prado, Madrid. He is represented in the National Gallery, London, by two early works and a much-restored replica of his 'Christ on the Mount of Olives.' There are better samples of his art in America. It is wonderfully modern-looking; the pictures he painted in his later days suggest our own Post-Impressionism: the light is so queerly distributed as to make the beholder think of limelight—or chalk. See Manuel B. Cossio's various works on T., especially *El Greco*, Madrid, 1908. On this is founded Calvert and Hartley's *El Greco*, 1909. See also A. Meyer's *El Greco*, Munich, 1911; two works by Maurice Barrès on *El Greco*, Paris, 1911 and 1912; Hugo Kehr's *Die Kunst des Greco*, Munich, 1914; Elizabeth du Gue Trapier's *El Greco*, New York, 1925; and Frank Rutter's, London, 1930. See also SPAIN—Spanish Art.

Thera (Thira, or Santorin), a Gk. island in the Ægean Sea, the most southerly of the Sporades group, and lying about 80 m. N. of Crete. Its steep shores vary in height from 500 to 1200 ft. The entire northern half is composed of volcanic material, and from the earliest times the island has been a centre of volcanic agency, being closely connected with the seismic movement disturbances to which the countries in the Ægean area are subject. The coastline is some 30 m. long, and opposite the inner or western curve lies the smaller island of Therasia. Pliny mentions the fact that the islands of Therasia and Aspro (S. of Therasia) were separated from T. by an eruption. Both T. and Therasia have in comparatively recent years yielded most interesting archaeological discoveries in the form of prehistoric dwellings, with antique vases and carefully-worked stone instruments. In Gk. legend T. is celebrated in the story of the Argonauts, the island being represented as sprung from a clod of earth which Triton presented to the heroes. According to Herodotus, Cadmus established a Phœnician colony in T. The tns. of the island are built along the edge of the cliffs, which are striking for their black lava tufa and other volcanic strata, much of which is deep red in colour. The largest tn. is Thera (pronounced Phera), the houses of which have their foundations in the tufa. The island produces some cereals such as barley, as well as figs, dried grapes, etc.

Theramenes, an Athenian, son of Hagnon, was a leading member of the oligarchical gov. of the Four Hundred at Athens, in 411 B.C. Subsequently, however, he not only took a prominent part in the deposition of the Four Hundred, but came forward as the accuser of Antiphon and Archeptolemus, who had been his intimate friends. After the capture of Athens by Lysander, Theramenes was chosen one of the Thirty Tyrants (404). See Thirlwall, *History of Greece*, vol. iv.

Therapeutæ, an ascetic sect akin to the Essenes, described in an anonymous work once ascribed to Philo Judæus (*Concerning the Contemplative Life*). This work is now held to be a forgery.

Therapeutics, Therapeusis, or **Therapy**, that branch of the science of medicine which deals with the cure of disease, the relief of certain symptoms, or the prevention of their occurrence by various agencies. Remedial agencies are divided into classes, according to general similarity of treatment, e.g. aerotherapeutics (q.v.), balneotherapeutics (q.v.), electrotherapeutics (q.v.), psychic thera-

peutics or hypnotism, serum therapeutics (*q.v.*), vaccine therapeutics (*q.v.*), hydrotherapeutics or hydrophathy (*q.v.*), etc.

Theresa, St., see TERESA.

Therezina, a tn. of Brazil, cap. of the prov. of Piahy, on the Parnahyba R. The manufacture of cotton thread, etc., is extensively carried on. Pop. 30,000.

Therm, the statutory unit of heat, on the basis of which coal-gas is bought and sold. It is equal to 100,000 British Thermal Units (B.Th.U.), and the latter unit is defined as the amount of heat required to raise 1 lb. of water through 1° F. (from 60° to 61° F.), and equals 251.9 calories (*q.v.*).

Thermæ were the huge buildings erected by the Rom. emperors, which comprised not only baths of various kinds, but often libraries, gymnasia, theatres, etc. The different varieties of baths which were taken, and the rooms, were briefly as follows: The apartment for undressing was the *apodyterium*; the *alipterium* or *unctuarium* was a room for anointing, etc.; in the *frigidarium* was a cold bath, and in the *calidarium* warm baths. The *tepidarium* was a warm room, with no bath, in which the bather usually spent some time before undressing. T. were built by Agrippa (21 B.C.) and by the emperors Nero (A.D. 65), Titus (S1), Domitian (95), etc.

Thermal Unit, see CALORIE.

Thermidor (from Gk. θερμη, heat, and δωρον, gift), a month in the Republican calendar, introduced at the time of the Fr. Revolution. It extended from July 19 to Aug. 18.

Thermionics and Thermionic Valve. T. is the branch of science that deals with the emission of electrons from matter under the influence of heat. Following the discovery of the electron by J. J. Thomson in the closing years of the nineteenth century, O. W. Richardson discovered the law connecting the emission of electrons from a body with its temperature. This emission is really an evaporation of electrons from the body, and the rate of the evaporation is a function of the temperature of the body; the higher the temperature, the greater the rate of evaporation. The evaporation depends on the nature of the surrounding gas, but Richardson found that in a highly evacuated atmosphere the formula $n = A\sqrt{T} \cdot e^{-b/T}$ is a fairly accurate representation of the phenomenon; n is the number of electrons emitted per sq. cm. of the surface of the body per sec., T its absolute temperature, b a constant, and A a constant, typical of the body. Further investigation by Langmuir led to the discovery that the evaporated electrons form a 'cloud' sur-

rounding the heated body, and that ultimately equilibrium is established between the rate of evaporation and the rate of 'condensation,' i.e. the return of the electrons under the electrical repulsion of the electron cloud or 'space-charge.'

The application of the results of Richardson's and Langmuir's researches led to the discovery and subsequent development of modern wireless technique, which depends for its success on the thermionic valve. In 1904 Fleming invented the *diode* or two-electrode valve. This consisted of a tungsten filament (heated by a battery of accumulators) surrounded by a cylindrical anode. The electrons

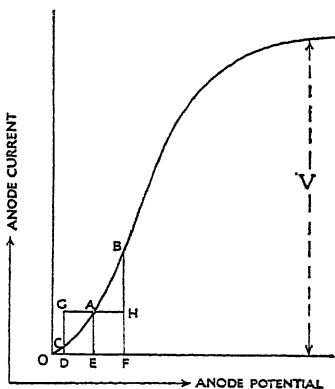


FIG. 1

emitted by the filament were drawn towards the anode by raising the anode to a higher potential than the filament by means of a H.T. battery. The electron current was therefore in the direction of the anode, and in this sense the diode acted as a valve. Langmuir's researches led to the result that in a highly evacuated atmosphere the anode current is approximately directly proportional to the (3/2)th power of the P.D. between the anode and the filament. Fig. 1 shows the relationship between these two quantities. For a given temperature of the filament 'saturation' is reached for the anode potential V volts, i.e. the electrons are dragged across to the anode as rapidly as they are evaporated. Rectification depends on the fact that the valve does not obey Ohm's Law, i.e. the curve is not a straight line, so that a fluctuation of the anode potential caused by an incoming A.C. signal results in a

net unidirectional electric current through the diode. Thus, suppose the anode is at the potential represented by OE , so that the anode current is represented by AE . If an A.C. signal is imposed on the anode circuit the anode potential will fluctuate to and fro, above and below the value AE . Suppose that it performs an excursion from AE to BF and back to CD , where $DE=EF$. The positive change in the anode current is BH , and this is much larger than the negative change GC . Hence in one excursion the net change of the anode current is positive. The introduction of a third electrode, known as the grid,

that of the anode. It screens the inner grid from the electrostatic effects of the anode circuit in high-frequency amplification. The *pentode* or five-electrode valve has a third protecting grid whose function is to prevent the electrons emitted by the anode under the bombardment by the direct electron stream from reaching the shielding grid. The pentode combines a high factor of amplification with a high internal resistance, and is therefore used as the loud-speaker valve in a wireless set. Fig. 2 shows how the pentode is used for this purpose. The original triodes were known as 'bright-emitters,' because

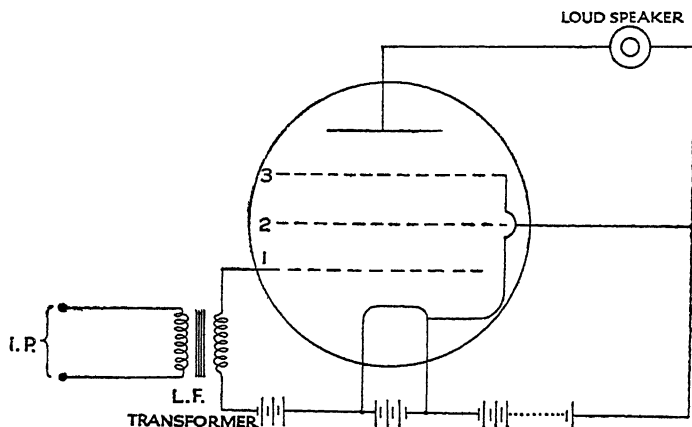


FIG. 2

created the modern *triode*. The grid is a fine mesh surrounding the filament, and its importance lies in the fact that a small fluctuation of the grid potential has the same effect on the anode current as a much larger fluctuation of the anode potential in the diode. In the diode the anode current is given by the relation $i = AV^{3/2}$; in the triode by the relation $i = B(V + kG)^{3/2}$, where G is the grid potential and k a factor much greater than unity. The triode, when used as an amplifier, makes use of the property that a small change of the grid potential gives rise to a much larger change in the anode potential (see WIRELESS TELEGRAPHY). In recent years a four-electrode valve, the *tetrode*, has been invented. This has two grids; the extra grid surrounds the usual grid, and is kept at a potential only slightly below

the temperature of the tungsten filament was very high (above 2000°C). Subsequently it was discovered that a filament made of platinum coated with the oxides and carbonates of barium or strontium resulted in electron evaporation at 1100°C . as efficient as in the former tungsten filament valves, and these 'dull-emitter' valves rapidly replaced the 'bright-emitter' type for ordinary reception. For details of wireless circuits the reader is referred to the article on WIRELESS. See also J. A. Fleming, *The Thermionic Valve and its Development in Radiotelegraphy and Telephony*.

Thermit, or Thermitite, a mixture of finely powdered aluminium and oxide of iron ('hammer scale,' Fe_3O_4), the heat of combustion of which produces a temperature of about 2600°C . It was invented by Vauten of London

and utilised for welding by H. Goldschmidt of Essen. In the reaction metallic iron and aluminium oxide are formed. Welding *in situ* is done by tapping the mixture over the ends of the rails or plates to be joined. The hot iron and slag raise the temperature of the ends to welding heat and metallic iron is deposited in the interstice. Thus on pressing together a perfect joint is made, dispensing with fish-plates and electric connections in electric traction rails. The mixture is also used for welding steel tubes and for mending iron castings. Oxides of other metals can be substituted for iron oxide, whereby the pure metal can be obtained as well as many valuable alloys by using mixed oxides. A disgraceful use of T. is in incendiary bombs.

Thermochemistry is the science, founded on the law of the conservation of energy, which deals with the thermal effects accompanying chemical actions. Reactions in which heat is evolved are called 'exothermic,' and where heat is absorbed they are termed 'endothermic.' Measurements of the heat of formation of substances, the heat of solution, of combustion, and of the neutralisation of acids and bases, have been determined; also the heat of hydration, the heat of combustion, the heat of ionisation, the heat of dilution, etc. The heat of formation of a compound is measured by the number of units of heat expended during the formation of one gram molecular weight of it from its elements. Heat of decomposition is the same as heat of formation, but with the sign reversed. The amount of heat liberated in chemical reaction is determined by allowing it to warm a known quantity of liquid (generally water) whose specific heat is known, and measuring the rise of temperature by means of an accurate thermometer. The water calorimeter generally employed for this purpose consists of an inner platinum vessel surrounded by water contained in an outer vessel of silver, which is protected by poorly conducting material so as to diminish the loss of heat by radiation. The reacting substances, either in the pure state or in solution, are brought to the same temperature and introduced into the inner vessel. The temperature of the water is taken before and after the reaction, and from the rise of temperature, the quantity of water present and its specific heat (and knowing the water equivalent of the calorimeter) the amount of heat liberated is determined. In order that a reaction may be studied thermochemically it must take place at

ordinary temperatures and must proceed rapidly to the end. Many reactions which do not fulfil these conditions, such as many processes of combustion, can be made to fulfil them. This is done by causing the substance to be burnt, in the presence of oxygen under increased pressure, in a steel bomb lined with platinum or enamel. Only in a comparatively few cases has it been possible to make direct determinations of the heat value of chemical changes. Thermal values which cannot be determined directly can be calculated indirectly by methods depending on the fundamental principle of thermochemistry which was propounded by Hess (1840). This principle, known as the 'constancy of the heat sum,' may be stated thus: 'The heat evolved in a chemical process is the same whether it takes place in one or in several stages.' The heat change, therefore, is dependent only on the initial and final stages of the reaction or system of reaction. Thus the heat of formation of methane cannot be determined directly, but a value may be arrived at by subtracting the heat evolved when methane is burnt from that evolved when the corresponding weights of free carbon and hydrogen are burnt. The unit of heat used in thermochemical measurements is the calorie, or the quantity of heat which is required to raise 1 gram of water from 0° to 1° C. The results of thermochemical measurements are expressed by symbols, which mean gram-atomic, or, in the case of compounds, gram-molecular weights of the substances which react. Thus $H_2 + O = H_2O + 68360$ calories means that 68,360 calories of heat are liberated when 2 grams of hydrogen and 16 grams of water unite at ordinary temperatures to form 18 grams of water. If the reacting substances are in solution, the presence of a large quantity of water is denoted by the symbol 'aq' - thus: $KOH_{aq} + HCl_{aq} = KCl_{aq} + 13,700$ calories. Other units of heat used are 100 gram-calories (K) and 1000 gram-calories (Cal.). As well as being of theoretical importance, thermochemistry has been found of great value in determining the heating power of fuels for commercial purposes and calorific values of foodstuffs. See H. C. Jones, *Elements of Physical Chemistry*; Scott, *Introduction to Chemical Theory*; Naumann, *Thermo-Chemie*; Thomson, *Thermochemistry*.

Thermodynamics. At the beginning of the nineteenth century the caloric theory of heat was supported by scientists generally. According to this theory, heat is a fluid called the caloric that occupies the interstices between the particles of a body.

The sum total of the caloric in the universe is constant, and it can neither be created nor destroyed. When a body is heated in a flame, caloric passes from the flame into the body, and the exchange increases the temperature of the body and decreases that of the flame. As the weight of a body does not increase when it is heated without chemical changes taking place, it was evident that the caloric was a weightless fluid. In order to explain the fact that different substances have different specific heats (*q.v.*), it was supposed that they possessed different affinities for the heat fluid. A change of state such as from ice to water without an accompanying rise of temperature was accounted for on the supposition that there was more room between the particles of water for the caloric and that a given weight of water therefore contained more caloric than an equal weight of ice. The theory had its uses, and it is interesting to note that the theory of the caloric is implicitly used to-day in the earliest stages of instruction in physics. Two semi-quantitative experiments troubled the supporters of the caloric theory near the beginning of the nineteenth century. The first was performed by Rumford (*q.v.*) in 1798. A quantity of water was placed in a crude calorimeter of gun-metal and a blunt steel borer pressing on its base was caused to rotate rapidly by means of horse power; eventually the water boiled, and Rumford demanded to know where the caloric had come from. The calorists gave the unsatisfactory explanation that a small quantity of the gun-metal had been broken up by the borer into fine powder and the caloric had escaped into the water. In the following year Davy (*q.v.*) caused two pieces of ice to be placed in the exhausted receiver of an air-pump arranged so that one piece of ice was fixed while the other was driven to and fro over its surface by means of a clockwork arrangement. Liquefaction was found to take place, and Davy confronted the calorists with the same serious problem of explaining the source of the caloric required to change the ice into water. Rumford and, to a lesser degree, Davy were convinced that the caloric theory had broken down and that 'heat is motion.' Nevertheless the caloric theory held its ground until the researches of Mayer and Joule in 1842 definitely established its falseness.

The First Law of Thermodynamics.

—Joule's experiment was essentially as follows. A special calorimeter was fitted with fixed lateral vanes between which other vanes attached

to a vertical spindle could rotate. Round a pulley mounted on this spindle a double cord was wound, to pass from there over two pulleys to lead weights hanging freely. The weights descended, and the water inside the calorimeter was churned, and was thereby heated. By a series of careful measurements Joule discovered that the amount of heat produced was always directly proportional to the mechanical work done in rotating the spindle. Furthermore, the constant of proportionality was always the same. The quantitative result of his experiments was that 772 foot-pounds of work done produce 1 British Thermal Unit of heat (*i.e.* the quantity required to raise the temperature of 1 lb. of water 1° F.). Joule's quantitative researches confirmed Mayer's qualitative speculations that *Heat is a form of Energy*. The Law of Conservation of Energy was now propounded by Joule in a lecture in Manchester in 1847, in which he gave 'the first full and clear exposition of the universal conservation of that principle now called energy.' His ideas met with a hostile reception not only in Manchester, but also from the British Association itself at its meeting in Oxford that year. Fortunately the attempt made to stifle the discussion of the paper by the illustrious chairman was frustrated by the enthusiasm of a young man in the audience, William Thomson, afterwards Lord Kelvin (*q.v.*), and from that date the real importance of the principle began to be realised. Expressed in simple terms, the First Law of T. states that Work is Heat and Heat is Work. It is an excellent example of a physical law, viz. a law that is based on physical measurements and claims to be a law only in so far as it is justified by those measurements. Refined experiments, notably by Callendar and Barnes and by Reynolds and Moody, have confirmed Joule's conclusions, and the accepted quantitative relation between heat and work is 1 calorie = 4.18×10^7 ergs or 4.18 joules. Expressed mathematically the law is written $W = H$, where both are expressed in the same units. A conservative preference for retaining the original units leads to the usual expression $W = 4.18 \times 10^7 \cdot H$, where W is measured in ergs and H in calories. The First Law of T. is a *sine qua non* of the Kinetic Theory of Matter that regards heat as the kinetic and potential energy of the molecules of a substance. Further, its importance in leading to the recognition that Heat, Light, Electricity, and Sound are all forms of energy cannot be too strongly emphasised.

T., however, had its origin in an attempt by Carnot 'to determine mathematically how much work can be gotten out of a steam-engine.' Carnot's researches were published in 1824, when he still held to the caloric theory. His theories were subsequently modified by William Thomson to accord with the dynamical theory of heat as expressed in the First Law of T. Carnot began by

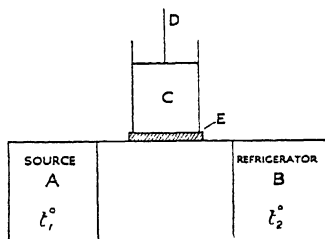


FIG. 1

considering an ideal heat engine, performing in a manner that enabled him to deduce the relation between the work done by the engine and the heat taken in from the furnace. A modern statement of his principles is as follows: Carnot's engine, Fig. 1, is a cylinder *C* fitted with a frictionless and air-tight piston *D*. The piston and the sides of the cylinder are supposed to be perfect non-conductors of heat, while the base is a perfect conductor of heat. The cylinder *C* can be placed either on a non-conducting slab *E* or in contact with the source of heat *A* at temperature t_1° or with the 'refrigerator,' or, as we should say, condenser, *B* at temperature t_2° . The cylinder may contain air or any other working substance under pressure. Fig. 2 is the Watt's indicator diagram (*q.v.*) of the Carnot cycle of operations performed by the engine. The cycle consists of parts of two isothermals *AB*, *CD*, corresponding to the temperatures t_1° , t_2° , and parts of two adiabatics *AD*, *BC*. The four stages corresponding to the parts *AB*, *BC*, *CD*, *DA* of a complete cycle are as follows: (i) The cylinder is placed in contact with the hot source t_1° and the piston is allowed to rise slowly so that while the working substance expands it takes up heat from the source, so that its temperature remains constant at t_1° . This isothermal expansion is represented by *AB* on the indicator diagram. (ii) The cylinder is now placed on the non-conducting slab *E* and the piston is allowed to rise still further. The

expansion is adiabatic, *i.e.* no heat is communicated to or abstracted from the working substance during this expansion, in which the temperature falls from t_1° to t_2° ; the expansion is represented by *BC* on the indicator diagram. (iii) The cylinder is now placed in contact with the condenser t_2° and the piston is slowly driven inwards, so that while the working substance is compressed it gives up heat to the condenser and its temperature remains constant at t_2° . This isothermal compression is represented by *CD* in the indicator diagram. (iv) The final stage is an adiabatic compression. The cylinder is placed on the non-conducting slab and compressed so that its temperature rises from t_2° to t_1° . The adiabatic compression is represented by *DA* in the indicator diagram.

The cycle of operations is now complete. We can deduce the efficiency of this engine in the following way. Let Q_1 be the heat absorbed by the working substance while in contact with the hot source during the isothermal expansion; let Q_2 be the heat rejected by the working substance to the condenser during the isothermal compression. The mechanical work done by the engine during one complete cycle is then represented by the area *ABNLA* + *BCPNB*—

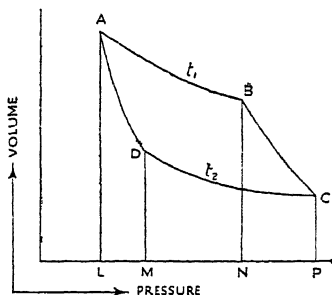


FIG. 2

DCPMD — *ADMLA* = area *ABCD*. By the First Law of T. this work W = net heat converted into work. Hence $W = Q_1 - Q_2$, since no heat is transferred to or from the substance during the adiabatic changes. The efficiency of an engine being defined as the ratio of the mechanical work done to the heat taken in at the source, the efficiency of the Carnot engine is $\frac{W}{Q_1}$ or $\frac{Q_1 - Q_2}{Q_1}$.

Reversible Engines.—Carnot's engine is an ideal one, but it gives us a

start in the development of the subject of T. A reversible engine is not merely one that will work in the reverse direction, reverse in the sense that the cycle is performed backwards and work is converted into heat, but one that works backwards so that at each stage of the process the heat taken up (or rejected) is exactly equal to the heat rejected (or taken up) in the forward process. Furthermore, the work done by the engine in the reversed process must be exactly equal to the work done by the engine at the corresponding stage of the forward process. The conditions for reversibility in this sense include (i) complete absence of frictional forces causing a dissipation of mechanical work; (ii) that no conduction of heat shall take place; (iii) that pressure differences between the working substance and the external atmosphere shall always be so small that 'free' expansion does not take place at any stage. It is clear that no real engine is reversible. Nevertheless, in accordance with the usual practice of discussing the mathematical physics of ideal processes in order to develop the underlying theory of engineering processes, the study of reversible engines leads to valuable results. Carnot's engine is a reversible engine, and from a study of its performance we are led to the conclusion known as *Carnot's Principle*, viz. no heat engine working between two given temperatures as source and condenser respectively can be more efficient than a reversible one. The formal proof of this principle depends on *The Second Law of T.* Two equivalent statements of this law are as follows: *It is impossible for a self-acting machine, unaided by any external agency, to convey heat from one body to another at a higher temperature (Clausius).* In other words, heat cannot of itself pass from one body to a hotter body. Kelvin's statement of this law reads: *It is impossible by means of inanimate material agency to derive mechanical effect by cooling a body below the temperature of the coldest of the surrounding bodies.* In other words, work cannot be obtained by using up the heat of the coldest body of a system.

The Second Law applies only to complete cyclical processes; there is no direct proof of this law. Our confidence in it depends on the fact that it accords with our practical experiences, and no objection to it has yet been upheld. The practical man will realise the meaning of the law from the approximate statement that if you have an engine it must work by drawing heat from a furnace and rejecting heat to a condenser. If the condenser is at the same temperature

as the furnace, the engine will not work; further, the engine will not work by using up the heat of the condenser and rejecting heat to the furnace.

Proof of Carnot's Principle.—Let A be a reversible engine, and let B be an engine working between the same source and condenser as A . Then it follows that the efficiency of B cannot be greater than that of A . For suppose it is; let the two engines be coupled together so that B working forwards drives A working backwards, and let B take up a quantity of heat Q from the source, while the amount of working substance in engine A is adjusted so that it delivers Q to the source when working backwards. If B rejects a quantity of heat Q_B to the condenser while A takes up a quantity of heat Q_A from it, then the efficiency of B is $\frac{Q - Q_B}{Q}$, while that of A is $\frac{Q - Q_A}{Q}$. Since the former is supposed to be greater than the latter

$$\frac{Q - Q_B}{Q} > \frac{Q - Q_A}{Q}$$

$$\therefore Q_A > Q_B.$$

The work done by B is $Q - Q_B$; that done by A is $Q - Q_A$. Hence the compound engine can do an amount $Q_A - Q_B$ of work in an external system. Now the net loss of heat from the source is zero, while the net loss of heat from the condenser is $Q_A - Q_B$. Hence this compound engine does work by using up the heat of the condenser. This violates the Second Law of T. Hence $\frac{Q - Q_B}{Q}$ cannot be

greater than $\frac{Q - Q_A}{Q}$, i.e. no engine can be more efficient than the reversible one working between the same source and condenser. Similarly it may be proved of all reversible engines working between the same source and condenser. It is interesting to note that the most efficient heat engines, the steam turbines, actually used to-day have an efficiency of about 33 per cent.

The whole science of T. is based on the two laws already stated. From this point, however, the science develops along two main lines: (i) its applications to heat engines, (ii) pure T., a powerful method of analysis in deriving a variety of important physical and chemical results. The theory of heat engines derives much from the theory of pure T.

Kelvin's Absolute Scale of Temperature.—The definition of a scale of temperature is given under THERMOMETER. Kelvin's absolute scale of temperature is independent of the properties of any thermometric sub-

stance and it is absolute in this sense. It is derived as follows: Let Q_1 be the heat taken in at temperature t_1 by a reversible engine and let Q_2 be the heat it rejects to the condenser at temperature t_2 . Then its efficiency is $\frac{Q_1 - Q_2}{Q_1}$ and by Carnot's Principle this is the efficiency of all reversible engines working between the source and condenser. Hence $\frac{Q_1 - Q_2}{Q_1}$ or

$(1 - \frac{Q_2}{Q_1})$ depends only on t_1 and t_2 , or

mathematically, $\frac{Q_1}{Q_2} = f(t_1, t_2)$ where f is some unknown function. Suppose we have two reversible engines, one working between t_1 and t_2 and the other between t_2 and t_3 , adjusted so that the first absorbs Q_1 from the source and rejects Q_2 to the condenser, while the second absorbs Q_2 from its source and rejects Q_3 to its condenser.

Then $\frac{Q_1}{Q_2} = f(t_1, t_2)$ and $\frac{Q_2}{Q_3} = f(t_2, t_3)$.

If these engines are coupled together they will act as a compound reversible engine absorbing Q_1 at the source t_1 and rejecting Q_3 to the condenser at t_3 .

Hence $\frac{Q_1}{Q_3} = f(t_1, t_3)$. But $\frac{Q_1}{Q_3} = \frac{Q_1}{Q_2} \cdot \frac{Q_2}{Q_3}$.
Hence $f(t_1, t_3) = f(t_1, t_2) \cdot f(t_2, t_3)$.

$$\therefore f(t_1, t_2) = \frac{f(t_1, t_3)}{f(t_2, t_3)}.$$

Suppose, now, t_3 is some standard temperature, while t_1 and t_2 are variable. Then $f(t_1, t_3)$ may be written as $\phi(t_1)$, where ϕ is some different function, and $f(t_2, t_3) = \phi(t_2)$.

$$\text{Hence } f(t_1, t_2) = \frac{\phi(t_1)}{\phi(t_2)}$$

$$\text{and therefore } \frac{Q_1}{Q_2} = \frac{\phi(t_1)}{\phi(t_2)}.$$

Kelvin therefore adopted a scale of temperature on which $\phi(t_1) = T_1$;

$\phi(t_2) = T_2$. Hence $\frac{Q_1}{Q_2} = \frac{T_1}{T_2}$. In other words, on the Kelvin scale of temperature the ratio of two temperatures is defined as the ratio of the heat absorbed at the source to the heat rejected to the condenser by a reversible engine working between those two temperatures. In view of

Carnot's Principle the ratio $\frac{T_1}{T_2}$ is the same whatever be the working substance in the engine, i.e. this scale is independent of the peculiar properties of any thermometric substance, and it is therefore absolute.

A T. thermometer consists of a series of reversible engines each doing the same amount of work W in a cycle.

The first takes in Q_1 at temperature T_1 and rejects Q_2 at temperature T_2 ; the second takes in Q_2 at temperature T_2 and rejects Q_3 at temperature T_3 ; etc.

But $W = Q_1 - Q_2 = Q_2 - Q_3 = \dots$ etc.,

and from above, $\frac{Q_1}{T_1} = \frac{Q_2}{T_2} = \frac{Q_3}{T_3} = \dots$ etc.

$$\therefore T_1 - T_2 = T_2 - T_3 = \dots \text{ etc.}$$

Thus equal intervals of temperature are indicated on the absolute scale of temperature. When we reach the temperature 0 on this scale the above equations show that the heat rejected to the condenser is zero, i.e. the condenser at that temperature cannot give any heat up to an engine using it as source. This is therefore the lowest possible temperature, and the zero of the absolute scale of temperature is the absolute zero of temperature. The Kelvin scale is, of course, an ideal scale, but the scale of a perfect gas thermometer can be shown to coincide with its indications. Now although there is no gas that is perfect, it is possible to reduce the readings of a gas thermometer such as the hydrogen thermometer to those of the ideal perfect gas thermometer. Hence all thermometer readings can be referred to the absolute scale of temperature, thus avoiding the idiosyncrasies of the different thermometric substances.

Entropy.—If a substance undergoing a reversible change takes in a quantity of heat dQ at temperature T , $\frac{dQ}{T}$ is called the increase of *entropy* of the substance. All natural processes are irreversible, and it can be shown that there is always an increase of entropy in such processes. Increase of entropy is accompanied by a loss of available energy in a system. Hence it follows that the processes of radiation, convection, conduction, etc., that involve an increase of entropy of the material universe also involve a loss of available energy in the universe. The entropy of the universe tends to a maximum that will be reached when all temperature differences have disappeared. The available energy in the universe will then be exhausted (Second Law of T.) and the universe will suffer what Jeans terms a 'Heat-death.' See Preston, *Theory of Heat*, 1929; Birtwistle, *Thermodynamics*, 1931; Duncan, *Steam and other Engines*, 1930.

Thermo-electricity, see ELECTRICITY.

Thermograph, an instrument used for automatically recording the fluctuations in the temperature of the air. The 'Richard' pattern of thermo-

graph consists of a curved metal tube containing a suitable liquid. Rise or fall of temperature respectively straightens or increases the curvature of the tube by the alteration in the volume of the liquid. The movement is transmitted by levers to a pen, which makes a trace on a revolving drum. The photographic thermograph of the Meteorological Committee consists of a revolving drum of prepared paper on which is photographed the position of a bubble of air introduced into the mercury column and which moves up and down with the temperature.

Thermometer and Thermometry. Temperature (*q.v.*) is defined as the scientific measurement of the degree of hotness of a body according to an arbitrarily chosen scale. The instrument used for such measurements is called a thermometer, and it makes use of some property of a substance that varies continuously with the temperature. A mercury thermometer, for example, makes use of the fact that the volume of a given mass of mercury varies continuously with its temperature; a platinum resistance thermometer employs the continuous changes of the electrical resistance of a platinum wire, while a constant volume gas thermometer makes use of the fact that the pressure of a given volume of gas varies continuously with its temperature.

One of the earliest thermometers was made by Galileo (*q.v.*). His instrument consisted of an inverted bulb, containing air, fitted with a narrow tube that dipped into a bowl of water. When the air inside the bulb contracted the water was driven up the tube by the atmospheric pressure. The instrument was susceptible to change in atmospheric pressure, and this rendered it quite unreliable. The Florentine Academicians constructed sealed thermometers containing alcohol as the thermometric liquid, while the first satisfactory mercury thermometer was made by Fahrenheit in 1714. Fahrenheit, regarding a mixture of ice and sal-ammoniac as providing the coldest temperature attainable, adopted its temperature as 0° F., and he took the temperature of a human being in good health as 24° F. He subsequently discovered that the degrees on this scale were too large and he altered the fixed points to 0° F. and 96° respectively.

The two fixed points that are universally adopted to-day are the temperature of clean, melting ice and the temperature of steam from water boiling under a pressure of 760 mm. of mercury (barometer

reading reduced to latitude 45° and sea-level). The centigrade scale of temperature defines these fixed points as 0° C. and 100° C. respectively, and the interval between them is divided into 100 equal parts each of which is 1° C. Réaumur's scale defines these fixed points as 0° R. and 80° R., while the modern Fahrenheit scale, in defining them as 32° F. and 212° F. respectively, keeps close to the amended Fahrenheit scale mentioned above, *e.g.* the temperature of a healthy human being is 98.4° F. Fig. 1 shows a comparison of these three scales.

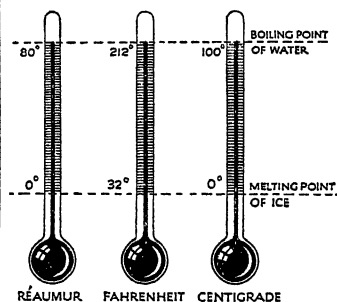


FIG. 1

Any temperature that is recorded on one of these scales may be changed to a temperature on either of the others by means of the simple conversion formula $\frac{C}{100} = \frac{F - 32}{180} = \frac{R}{80}$.

The centigrade scale is used in all scientific work and in most Continental countries; the Réaumur scale is popular in Norway and Sweden, while the Fahrenheit scale is generally used in the British Isles.

Construction of a Mercury-in-Glass Thermometer.—A capillary tube having a uniform bore is selected. The smaller the bore the more sensitive the thermometer for a bulb of given size. The tube is thoroughly cleaned, and a bulb is blown on one end. The size of the bulb is determined by the purpose for which the instrument is required. For very sensitive work a large bulb is used, but for rapid readings it is necessary to have a bulb that contains only a small amount of mercury. Fig. 2 shows the thermometer ready for filling. Some clean mercury is placed in the wider tube A and the bulb and stem

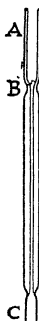


FIG. 2

are heated gently. The air expands and bubbles out through the mercury. The bulb is now allowed to cool, when the air inside contracts and the atmospheric pressure forces down some mercury into the bulb. The process of heating and cooling is repeated until the bulb is nearly full of mercury. In order to get rid of the last traces of air the mercury is now boiled and the mercury vapour carries off the air with it. On cooling, the bulb and stem are left completely full of mercury. If, for example, the thermometer is required to measure temperatures up to 100°C . it is now placed in a bath of glycerine at about 110°C ., and while the bulb and stem are completely filled at this temperature, the thermometer is sealed off at *B*. As glass behaves peculiarly after strong heating the thermometer is now laid aside for a year before it is graduated. The fixed points are then determined by placing the thermometer in clean, melting ice and allowing the mercury to take up the temperature of the ice. The thermometer is then pulled up so that the meniscus can just be seen, and a light scratch is made at that point with a sharp file. The thermometer is then pushed down into the ice; it is again pulled up, and if the meniscus is still at the same level the scratch is taken as 0°C .; if not, the process is repeated until two consecutive readings agree. Fig. 3 is the boiling point apparatus. The thermometer is left in the steam for some time, and a scratch is then made at the level of the meniscus. The thermometer is then pushed down into the steam and a second reading is taken later; if this coincides with the first, then the scratch is definitely taken as marking the temperature of the steam. The barometer is then read and the temperature of the steam is taken as 100°C . if the corrected barometer reading is 760 mm. of mercury. Vapour-pressure tables give the necessary corrections when the barometer is not at this pressure. The interval between 0°C . and 100°C . is then divided into 100 equal parts and the degrees are etched on the scale. While the mercury-in-glass thermometer has many disadvantages, its popularity for general use depends on the fact that all its idiosyncrasies are known to the maker, since this type of thermometer has been used for over 200 years. The maker can therefore supply a mercury thermometer that is tolerably free from errors. Alcohol thermometers are fairly common, and they possess some advantages over mercury thermometers, but as alcohol boils at 78°C . their use is limited.

Maximum and Minimum Thermometers.—A common type of *maximum* thermometer consists of an ordinary mercury thermometer whose stem is fixed in a horizontal position. A

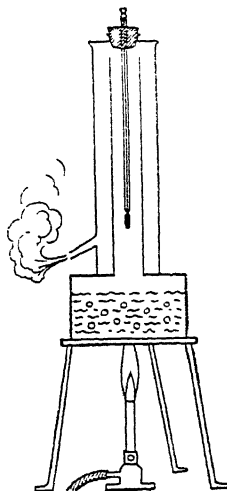


FIG. 3

small iron index, shaped like a dumb-bell, is placed in the tube of the stem (Fig. 4). When the mercury expands it pushes the index in front

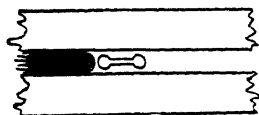


FIG. 4

of it, but when it contracts it leaves it behind. The end of the index nearer the bulb thus indicates the maximum temperature reached. To

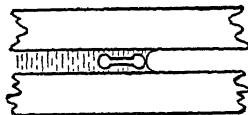



FIG. 5

reset the thermometer, the index can be moved into position by means of a magnet.

Fig. 5 shows the index of a *minimum* thermometer that uses alcohol as

the thermometric liquid. When the alcohol expands it flows past the index, but when it contracts it drags the index back with it. The end of the index farther from the bulb thus indicates the minimum temperature reached. The index can be reset by means of a magnet.

Clinical Thermometer.—This is really a maximum thermometer—indeed, most maximum thermometers are of the clinical pattern. The instrument is shown in Fig. 6.



There is a narrow constriction of the bore just above the bulb of the thermometer. When the mercury expands it can force its way past the constriction; but when it contracts the column of mercury above the constriction is not heavy enough to force its way back, and the maximum temperature can therefore be read at any convenient time. The instrument is reset by holding the thermometer firmly and giving it a sharp downward jerk, when the mercury is forced back into the bulb by the centrifugal force. Reliable clinical thermometers bear the National Physical Laboratory's mark on the back, viz. \mathcal{N}° .

Gas Thermometers.—A gas thermometer is much more sensitive than a liquid-in-glass thermometer, because the coefficient of expansion of a gas is much larger than that of a liquid. Moreover, the thermal capacity of the gas contained in a thermometer is far smaller than that of the liquid in a thermometer. A gas thermometer, however, is cumbersome, and it cannot be used unless there is a fairly large quantity of the liquid whose temperature is to be measured.

As mentioned in the article on THERMODYNAMICS, the hydrogen thermometer is the standard to which all other thermometers are referred, because the relation between the absolute scale of temperature and the hydrogen scale is known.

Fig. 7 shows the essential parts of a simple gas thermometer known as the *Constant Volume Air Thermometer*. The large bulb *A* and the connecting wide capillary tube contain air or hydrogen, etc., while the tubes *BDC* form a simple manometer. The instrument is calibrated by placing the bulb in clean, melting ice and allowing the air to take up the temperature of the ice. The vertical tube *C* is now raised or lowered until the mercury in the vertical tube *B* is

brought opposite some convenient graduation on a scale mounted between *B* and *C*, and the pressure of the air in the bulb is then read off from the manometer. In the present instance this pressure would be $P + H$, where P is the height of the mercury barometer and H is the vertical height of *C* above *B*. Suppose this pressure is called p_0 . The bulb is now placed in boiling water and the tube *C* is again adjusted to bring the mercury in *B* back to the same graduation as before—hence the name

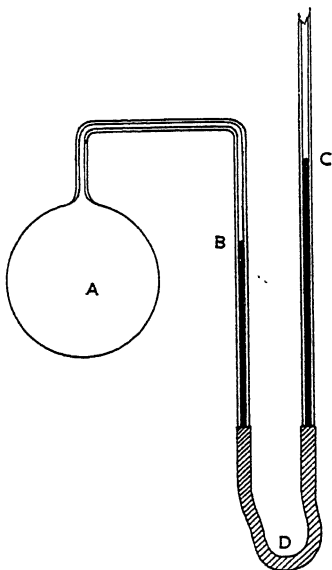


FIG. 7

constant volume air thermometer. Let p_{100} be the pressure of the air in the bulb at the boiling point of water (taken as 100°C . if the corrected barometer reading is 760 mm.; see remarks on graduation of mercury thermometer). Then a rise of 1°C . on this thermometer is defined as the rise of temperature that produces an increase of pressure of the constant volume of air of amount $\frac{p_{100} - p_0}{100}$. The temperature corresponding to any pressure p of the constant volume of air will be $\frac{p - p_0}{p_{100} - p_0} \cdot 100^{\circ}\text{C}$.

Platinum Resistance Thermometer.—This instrument was perfected by

Callendar and Griffiths. It is remarkable for its range (-200°C. to 1500°C.) and for its high sensitivity, measurements to $1/100^{\circ}\text{C.}$ being made quite simply. The thermometer consists essentially of a wire of pure platinum enclosed in a glass or fused silica tube. The instrument is calibrated by plunging it into clean, melting ice and finding the electrical resistance R_0 of the wire while at that temperature. The resistance of the wire R_{100} while at the temperature of steam boiling under a pressure of 760 mm. of mercury is then determined by placing the tube in a boiling-point apparatus. On the platinum centigrade scale a rise of 1°C. then corresponds to an increase of $\frac{R_{100} - R_0}{100}$ in the resistance of the

wire. The indications of a platinum resistance thermometer vary considerably from those of a gas thermometer, but there is a simple reduction formula connecting the readings of the two thermometers. If t is the temperature recorded by a hydrogen thermometer when the platinum thermometer registers a temperature p , then

$$t - p = \delta \left\{ \left(\frac{t}{100} \right)^2 - \left(\frac{p}{100} \right)^2 \right\},$$

where δ is a constant of the thermometer that is determined by finding the resistance at some temperature known on the hydrogen scale, e.g. at the boiling point of sulphur, 444.53°C. The usual value for δ is 1.5. Reduction tables are supplied by the instrument makers. A special form of Wheatstone Bridge (*q.v.*) is used for measuring the resistance of the wire, and the arrangement eliminates the effect of the variable resistance of the leads to the platinum wire. The three instruments most widely used in the commercial world for high-temperature measurements are the platinum resistance thermometer, the thermoelectric thermometer and the radiation pyrometer. For the last two types see ELECTRICITY and PYROMETERS. See also Preston, *Theory of Heat* (1929); Smith, *Pressure Gauges, Indicators, Thermometers, Pyrometers* (1924).

Thermopylæ, often called simply *Pyliæ*, a celebrated pass leading from Chessaly into Locris. The pass of C. is especially celebrated on account of its heroic defence by Leonidas against Xerxes, 480 B.C.

Theron (d. 472 B.C.), a tyrant of Agrigento, the son of *Ænesidemus*. He seized the reins of gov. about 488, and strengthened his position by marrying his daughter to Gelon.

With this ally he won a great victory over the Carthaginians at Himera in 480.

Theseurus, see DICTIONARY.

Theseus, the great legendary hero of Attica, was the son of *Ægeus*, King of Athens, and of *Æthra*, the daughter of *Pittheus*, King of *Troezen*. He was brought up at *Troezen*, and when he reached maturity he took, by his mother's directions, the sword and sandals, the tokens which had been left by *Ægeus*, and proceeded to Athens. Eager to emulate *Hercules*, he went by land, displaying his prowess by destroying the robbers and monsters that infested the country. By means of the sword which he carried, *Theseus* was recognised by *Ægeus*, acknowledged as his son, and declared his successor, to the exclusion of the sons of *Pallas*. The capture of the Marathonian bull, which had long laid waste the surrounding country, was the next exploit of *Theseus*. After this he went of his own accord as one of the seven youths whom the Athenians were obliged to send every year, with seven maidens, to *Crete*, in order to be devoured by the *Minotaur*. When they arrived at *Crete*, *Ariadne*, the daughter of *Minos*, became enamoured of *Theseus*, and provided him with a sword with which he slew the *Minotaur*, and a clue of thread by which he found his way out of the labyrinth. Having effected his object, *Theseus* sailed away, carrying off *Ariadne*. He was generally believed to have had by her two sons, *Cenopion* and *Staphylus*. As the vessel in which *Theseus* sailed approached Attica, he neglected to hoist the white sail, which was to have been the signal of the success of the expedition; whereupon *Ægeus* threw himself into the sea. *Theseus* thus became King of Athens. One of the most celebrated of the adventures of *Theseus* was his expedition against the *Amazons*. He is said to have assailed them before they had recovered from the attack of *Hercules*, and to have carried off their queen, *Antiope*. The *Amazons* in their turn invaded Attica, and the final battle in which *Theseus* overcame them was fought in the very midst of the city. *Theseus* was said to have had, by *Antiope*, a son named *Hippolytus*, and after her death to have married *Phædra*. *Theseus* figures in almost all the great heroic expeditions. He was slain by *Lycomedes*.

Thesiger, Frederic, see CHELMSFORD, **FREDERIC THESIGER**.

Thesmophoria, a festival in honour of *Demeter* as the founder of agriculture and patroness of marriage, celebrated widely in Greece and especi-

ally at Athens. It was held for five days in the month Pyanepsion (early Nov.), only married women of Attic birth and stainless character taking part. On the first day of the feast (*Στήνια*) there was a procession to the deme or township of Halimus. See Preller, *Demeter and Persephone*, p. 335 (1887); Mommsen, *Heortologie*, p. 287; Harrison, *Prolegomena to the Study of Greek Religion*, 1908; Scholion on Lucian, *Dial. Meretr.*, ii. 1, published by Rohde, 1870; Smith, *Dict. of Antiq.*, 1891. See MYSTERIES.

Thespiæ, an anct. Gk. city near the base of Mt. Helicon, in Boeotia. Its history seems guided by an inveterate hatred for the neighbouring and stronger city of Thebes, which dismantled its walls in 423 B.C., captured it in 372 B.C., and finally razed it to the ground. In 480 B.C. T. did not disgrace itself by mediating to the Persians. This city was the proud possessor of the beautiful 'Eros' of Praxiteles which the sculptor gave to Phryne, his mistress.

Thespis, the father of Gk. tragedy, lived during the latter part of the sixth century B.C. He introduced into the old tragedy connected with the Dionysian festivals an actor, for the sake of giving rest to the chorus. This actor took various parts in the same piece under various disguises, which took the form of linen masks. See A. E. Haigh, *Tragic Drama of the Greeks*, 1896; A. Croisat, *History of Greek Literature*, 1904.

Thessalonians, The Epistles to the, were probably written by St. Paul from Corinth at the time when he was working there with Silvanus and Timothy (Acts xviii. 5) between A.D. 51 and 53. They are, therefore, among the earliest of St. Paul's epistles, and their genuineness is universally acknowledged. In Acts xvii. we read of St. Paul's visit to Thessalonica, and of the bad reception he received from the Jews. The Gks. and devout women, however, showed much eagerness to learn his message, and to them he turned. The Epistles, then, which follow each other closely, are addressed to a Gentile audience. The immediate occasion of the First Epistle is the favourable intelligence brought to the Apostle by Timothy of the steadiness with which the Thessalonians adhered to the faith in spite of the persecutions with which they were assailed by their own countrymen. From it we learn what had been St. Paul's message and appeal when he was himself in Thessalonica. He had appealed to the primary feelings of the human heart and then passed on to speak of Jesus 'which delivereth us from the wrath to come' (i. 10). This particular

insistence on the Judgment and the Second Advent had led to much questioning, and in the latter part of the letter St. Paul deals with this. His letter, however, did not settle all difficulties, though the news which St. Paul later received from Thessalonica was in many aspects encouraging. The expectation of the immediate coming of the Lord still caused great excitement and the neglect of the duties of daily life. The Second Epistle is intended to allay this excitement. See article in Hastings's *Dictionary of the Bible* and Cuthbert Lattey's trans. of the Epistles to the Thessalonians (1913).

Thessalonica, see SALONICA.

Thessaly, the largest div. of Greece. Thessaly Proper is a vast plain shut in on every side by mountain barriers, broken only at the N.E. corner by the valley and defile of Tempe, which separates Ossa from Olympus. This plain is drained by the R. Peneus and its affluents. In addition to the plain already described, there were two other dists. included under the general name of Thessaly; one, called Magnesia, being a long narrow strip of country extending along the coast of the Ægean Sea from Tempe to the Pagasæan Gulf, and the other being a long narrow vale at the extreme S. of the country, lying between Mts. Othrys and Ceta. Thessaly Proper was divided in very early times into four dists. or tetrarchies, a division which we still find subsisting in the Peloponnesian War. These dists. were: (1) Hestiatotis, the N.W. part of Thessaly; (2) Pelasgiotis, the E. part of the Thessalian plain; (3) Thessaliotis, the S.W. part of the Thessalian plain; (4) Phthiotis, the S.E. of Thessaly. Besides these there were four other dists., viz.: (5) Magnesia; (6) Dolopia, a small dist. bounded on the E. by Phthiotis, on the N. by Thessaliotis, on the W. by Athamania, and on the S. by Ceteæ; (7) Ceteæ, a dist. in the upper valley of the Spercheus; and (8) Malis. The Thessalians were a Thesprotian tribe, and invaded the W. part of the country, afterwards called Thessaliotis, whence they subsequently spread over the other parts of the country. The gov. in the separate cities became oligarchical, the power being chiefly in the hands of a few great families descended from the anct. kings. Of these, two of the most powerful were the Aleuadæ and the Scopadæ. The Thessalians never became of much importance in Grecian history. In 344 B.C. Philip completely subjected Thessaly to Macedonia. The victory of T. Flamininus at Cynoscephalæ, in 197, again gave the

Thessalians a semblance of independence under the Romans.

Thetford, a municipal bor. and market tn., of Norfolk, England, at the junction of the Thet with the Little Ouse. Castle Hill is a large earthwork of antiquity. Pop. (1931) 4097.

Thetis, in Gk. mythology, a sea-goddess, daughter of Nereus (*q.v.*) and Doris, and mother of Achilles. Poseidon and Zeus are said to have sued for her hand; but when Themis (*q.v.*) declared that the son of T. would be more illustrious than his father, both gods desisted from the suit. Others state that T. rejected Zeus because she had been brought up by Hera and that the god, to revenge himself, decreed that she should wed a mortal; and, at length, she was given against her will in marriage to Peleus (*q.v.*).

Theuriet, André (1833-1907), a Fr. novelist and poet, b. at Marly-le-Roi. Among his numerous novels may be mentioned: *Mademoiselle Guignon*, 1874; *Le Filleul d'un Marquis*, 1878; *Flavie*, 1895; *L'Oncle Scipion*, etc.

Thian-Shan, see TIAN-SHAN.

Thibaut IV. (1201-53), Count of Champagne and King of Navarre. On the death of Louis VIII., a league was formed by a number of the most powerful Fr. nobles to prevent Blanche, the queen, from acting as regent. T. was at the outset a party to this confederacy, but soon abandoned it, which greatly incensed the Duke of Bretagne and his coadjutors, and they soon after formed the project of harassing him by supporting the claims of the Queen of Cyprus upon Champagne and Brie. Louis IX. marched to the assistance of T., and a compromise was arranged. Sixty-six poems are attributed to T.

Thibaut, Anton Friedrich Justus (1772-1840), a Ger. jurist, b. at Hameln, and after studying at Göttingen, Königsberg, and Kiel, was appointed professor of civil law at the last-named university in 1798. In 1802 he removed to Jena, and four years later to Heidelberg, where he remained till his death. He published *Theorie der logischen Auslegung des Römischen Rechts* (1799), etc.

Thibaut, Jacques, Fr. violinist, b. at Bordeaux, Sept. 27, 1880. Studied under Marsick at Paris Conservatoire. Rose to fame as a virtuoso dates from 1898. In technique, he represents the wide and pure technique of the great classical school, passed down to him through Marsich and Ysaye.

Thibaw, or Hsipaw, a Shan state of Upper Burma, with an area of 5080 sq. m., traversed by the Namtu. Rice, cotton, and tea are the chief articles of produce. Pop. 130,000.

Thibet, see TIBET.

Thielt, a tn. of W. Flanders, Belgium, 15 m. S.E. of Bruges. It is an anct. tn., and was largely destroyed by fire in 1383. It has a linen-bleaching industry, manufs. textiles, brushes, lace, boots, shoes, and trades in grain and tobacco. There is an old cloth-hall and a fine belfry. Pop. 11,800.

Thierry, Jacques Nicolas Augustin (1795-1856), a Fr. historian, b. at Blois. On leaving school he became the secretary of Saint-Simon, at whose suggestion he published his first work, *De la Réorganisation de la Société Européenne*. His *Histoire de la Conquête de l'Angleterre par les Normands* (1825) cost him his eyesight. His other publications include: *Récits des Temps Mérovingiens*, 1840, and *Recueil des Monuments inédits de l'Histoire du Tiers Etat*, 1850-70.



LOUIS ADOLPHE THIERS

Thiers, a tn. of dept. Puy-de-Dôme, France, on R. Durolle. There are important manufs. of cutlery, whalebone, and bank-note paper. Pop. 15,859.

Thiers, Louis Adolphe (1797-1877), a Fr. statesman and historian, b. at Marseilles of humble parentage. In 1821 he entered the offices of the *Constitutionnel*, his articles in which quickly placed him in a position of independence. Journalism not satisfying his ambition, he collaborated with Félix Bodin in the production of a *History of the Revolution* (the greater part of which was the work of T.). In 1830, his antipathy to the Bourbons

prompting him to seek a more vigorous polemical field than that of the *Constitutionnel*, he founded the *National*. After the nomination of Louis Philippe as King of France, T. was rewarded for his publicist services by being nominated a councillor of the state and given a post in the Treasury. Later he became Under-Secretary of State to the Treasury (1831), supporting the peace policy of Casimir Périer. Was Minister of the Interior in Soult's cabinet of 1832 during the Paris insurrection, the sanguinary suppression of which has left an ineffaceable blot upon his name. In 1836 he was placed at the head of the cabinet, and carried out, among other liberal reforms, the suppression of lotteries and gaming-houses, and the reduction of tariff duties on inland trade. In 1840 he became President of the Council and Foreign Secretary. He supported Mehemet Ali against Turkey with the object of assuring to the latter the retention of Egypt, and later, after the conclusion of peace between England, Russia, Turkey, Prussia, and Austria, he made all preparations for war as a demonstration against the exclusion of France from the European concert, but his policy resulted only in the prompt recalling of the Fr. fleet from Turkish waters and his own retirement. He then devoted himself to writing historical works, and published his huge work, the *History of the Consulate and of the Empire*. After the proclamation of the republic on the fall of Louis Philippe's gov., he made strenuous efforts to overthrow the republic while appearing to support it, but his reactionary efforts caused him to be banished from Fr. territory on the subsequent restoration of the empire, whither he did not return till 1852. In 1863 he was nominated deputy for one of the divisions of Paris. On the fall of the empire following upon the débâcle at Sedan, he was elected President of the Assembly, and shortly after became President of the republic. In 1873, wishing to avoid being made the instrument of monarchist intrigue, he voluntarily resigned. Other works of his are: *The Monarchy from 1830*; *The Law of Property*, 1848; *Saint Helena*, 1862; *Communism*, 1849.

Thigh, the part of the lower limb between the pelvis and the knee. The T.-bone, or *femur*, is the longest bone in the human body, constituting about 0.275 of the height from sole to crown. It articulates with the *os innominatum* above, and with the *tibia* below.

Thionville, a Fr. tn. in Lorraine, situated on the Moselle, 20 m. N. of

Metz by rail, in the dept. of Moselle. The former Ger. name was Dieden-hofen. The tn. is of anct. origin and strongly fortified. Imperial diets were held here in the eighth century; in 1870 it surrendered to the Prussians. It has manufactures of wine, hosiery, and iron goods. Pop. 12,000.

Thiophene, C₄H₄S, a colourless liquid (b.p. 84° C.) discovered in 1883 by Victor Meyer as an impurity in benzene obtained from coal tar. It gives a blue coloration with isatin dissolved in concentrated sulphuric acid, and in its general properties closely resembles benzene (*q.v.*). T. may be separated from benzene by prolonged shaking with cold concentrated sulphuric acid, which removes the T.

Third International or Komintern, the international organisation of the Communists, founded immediately after the Great War. It is lineally descended from the First and Second International(s), but with the fundamental difference that its aims are definitely and frankly revolutionary, whereas the first two bodies were Socialist labour organisations founded on the principles of Karl Marx. The original name of the first organisation was the International Workingmen's Association, called briefly the International or Internationale. The virtual founder of the International was Marx, the actual foundation, in London in Sept. 1864, receiving its impulse from a visit of Fr. workmen to the International Exhibition in London in 1862. The organisation, curiously enough, seems to have been countenanced, if not supported, by the Emperor Napoleon III. Marx drew up its 'statutes,' which were adopted by a congress at Geneva in 1866. It became increasingly Socialist in outlook; but when, in 1869, Michael Bakunin (*q.v.*), the Russian anarchist, entered it with his followers, it became more revolutionary. The advent of the anarchists, however, was the doom of the International, for it led to internecine conflict between them and the Socialists. From this conflict Marx and his adherents emerged victorious, and the conference at The Hague in 1872 expelled the anarchist element. From this expulsion the association never recovered, for, although one more conference was held, at Geneva, in 1873, the organisation ceased from that date, though Bakunin's International lingered a little while longer, specially in the Latin countries. Then, in 1889, an international Socialist congress met in Paris to celebrate the centenary of the Fr. Revolution, and from that date international Socialist congresses were held in different countries every three years until

the Great War. The War, however, proved the doom of the Second International—that of 1889. During that great conflict it was moribund. The Socialists of *Mittel Europa* were on most unfriendly terms with those of the Entente countries. In every belligerent country there was a cleavage in the national Socialist party on the question of co-operating with the 'bourgeois' gov., the Majority Socialists generally sharing the popular enthusiasm for national victory, while the Minority or Independents normally indulged in carping criticism. Conspicuous figures like Scheidemann of Germany, Guesde of France, and Vandervelde of Belgium were whole-hearted champions of their respective national causes. Holland and the Scandinavian countries held the dispirited remnants. But with the advent of the Russian Revolution in 1917 the international Socialists took heart again, and in May of that year a group of Russian Socialists published an appeal for the reassembling of the Internationale, and for the convening of a peace congress (see STOCKHOLM CONFERENCE). The chief result of the Second International was the organisation of Labour into trade unions and political parties, not essentially a foundation on which the international revolutionary can build the highest hopes, as was shown by the collapse of the Second International on the outbreak of the War. The Communist parties aimed at the absorption of the International in an organisation of their own, whence the foundation of the T. I., in 1919, as an essentially revolutionary body formed for the express object of promoting a world revolution. This organisation receives its instructions from a central bureau, instructions which dictate the tactics its members shall employ in Parliament and so forth. This bureau has close ties with the Russian Gov. or Soviet, which carries on intensive propaganda, especially in the Near and Far East and in parts of Africa. So far as experience in British colonies, mandated territories, or protectorates is concerned, the Communist organisation has accomplished next to nothing of a permanent character; while in Great Britain the failure of the body to return a single member to Parliament in the election of 1931 is an indication that while many electors may be Socialists, but few are Communists.

Third Party Insurance is insurance against liability to pay damages for personal injuries sustained by third persons or for injuries to the property of third persons. This form of

insurance has gained in popularity in view of the fact that the insurer is thereby relieved of the trouble of dealing with the claim, whether genuine or not, and of all legal costs and expenses. In their inception, T. P. policies were taken out in respect of horse-drawn vehicles; other risks were gradually accepted by the insurance companies, until to-day all manner of risks are covered. The largest development has been in regard to motor business, especially since the Road Traffic Act of 1930, under which T. P. I. was made compulsory, and the chief feature of the motor policy now lies in the 'liability to the public' section. (See MOTOR VEHICLE INSURANCE.) Most insurance companies, however, now deal with this class of business as a separate activity. Experts aver that legislation has given no great impetus to T. P. I., though some business accrues as a consequence of the Housing Acts, a class of business known as 'Property Owners' Indemnity' and 'Landlords' Indemnity.' Probably improved housing conditions have gone some way towards diminishing risks of injury from property in disrepair. In the usual form of T. P. I. policy, the event giving rise to a claim is an accidental injury to the person or property of a stranger alleged to be due to *negligence* or *nuisance*—slum dwellings afford an instance of the latter ground. An example of personal risk through negligence is afforded by claims based on the lack of reasonable skill in the conduct of professional duties—a risk to which doctors, lawyers, accountants, and other professional persons are obviously liable; but it appears that, though such risks may often be of grave importance, T. P. I. has not been cultivated by insurance companies among such practitioners to any considerable extent, and experience shows that such risks have not proved satisfactory to underwriters, so that they are not now widely accepted. Generally speaking, insurance companies find their third-party departments profitable, and there is considerable competition for the business on its own merits, although freedom in rating has led to some risks being accepted at very low premiums in order to protect tariff-rated insurance against competition. In this connection, however, driving accident insurance and cinema risks are classes of public liability business which have been somewhat fettered by tariffs.

Consult *Pitman's Dictionary of Accident Insurance*, edited by J. B. Welson, 1928, where the various risks covered by T. P. I. are detailed.

Thirlage, in Scots law, is that servitude by which possessors of lands in some parts of the country are bound to grind their grain at a particular mill—to which mills the lands are said to be 'astricted' or 'thirled.'

Thirlmere, a lake of the Lake District, Cumberland, England, $3\frac{1}{2}$ m. S.S.E. of Keswick. It is 3 m. in length and about $\frac{1}{2}$ m. in width, with a depth of nearly 100 ft. It is surrounded by lofty heights; on its E. shore rise Helvellyn and Whiteside, whose slopes are well wooded, while on its W. side are Armboth Fells and Raven Crag, whose slopes are cut by mountain torrents. T. affords the water supply of Manchester.

Thirlwall, Connop (1797–1875), an Eng. divine and historian, b. in London; was educated at the Charterhouse, London, and Trinity College, Cambridge, and was called to the Bar in 1825; but, the law not attracting him, he took holy orders in 1827, and became tutor and lecturer at Cambridge until 1834, when he was given the living of Kirby Underdale. In 1840 he was appointed by Melbourne to the see of St. David's. He translated works by Tieck, Schleiermacher, and Niebuhr into Eng., and wrote several books. His masterpiece was his *History of Greece* (1835–44).

Thirsk, a market tn. and rural district of the N. Riding of Yorkshire, England. Its fairs and markets are noted, and a trade is carried on in livestock, corn, wool, timber, etc. Pop. (1931) of rural district, 12,148; area 71,650 acs.

Thirst, a desire for drink, made known by sensations projected to the pharynx. The amount of water contained in the body is subject to great changes. It is always being lost by various organs, the amount lost varying greatly with the conditions of life. This loss directly affects the blood, but this is not lasting, as the blood draws upon the vast resources of the other body tissues for its supply of water; consequently the tissues require a new supply to restore them to their normal state. The sense of T. then comes into play; we become thirsty and take into our bodies water in varying quantities according to our needs. Little is known concerning the nervous mechanism controlling this sensation, but it is assumed that as the water content falls below a certain amount the nerves in the pharyngeal region are stimulated and so give rise to T.

Thirty-nine Articles, The, of the Church of England are described in their heading as 'Articles agreed upon

by the archbishops and bishops of both provs. and the whole clergy, in the Convocation holden at London in the year 1562, for the avoiding of diversities of opinions, and for the establishing of consent touching true religion.' Their history, however, begins before this date. On the death of Henry VIII., the gov. of the country was left in the hands of a group of nobles, of whom almost all were in favour of the reformed doctrines, and the changes in the teaching and practice of the church increased with great rapidity. The auct. landmarks were being removed, and it was desirable that fresh ones should be set up. In 1549, parliament empowered the king to appoint a commission for the drawing up of ecclesiastical laws, and in accordance with this Act a commission was appointed in 1551 consisting of eight bishops, eight divines, eight lawyers, and eight other representatives of the laity. This commission, which included Cranmer, Ridley, Coverdale, and Peter Martyr, began by drawing up a code of forty-two articles which were published by royal authority in 1553. It seems probable that Strype and Burnet are wrong in making it appear that these articles had also behind them the authority of the Convocation of 1552. To these articles was prefixed Cranmer's *Catechism*. In the same year Edward VI. d., and the Convocation of the first year of Mary denied that the articles had received its consent, and entirely repudiated them. The tide of reformation was thus stemmed for a while, but on the accession of Elizabeth it was resumed. This period is marked by greater moderation. Parker occupied the see of Canterbury, and he submitted to Convocation a revised form of the original forty-two articles. These underwent considerable further alterations, in course of which they were reduced in number to thirty-nine, and were finally promulgated in 1571. The first half of the twentieth article was omitted in some copies, and there continued to be some discussion as to which was the authorised form, until in 1604 they were finally settled in the form in which they are now used. The T. A. were adopted by the Convocation of the Irish Church in 1635, and by the Scottish Episcopal Church in 1804. Especially during the last century, controversy has raged as to the nature and meaning of the articles. Some have tried to interpret them as an orderly body of divinity, but they are plainly devised to meet a special need, and bear the marks of compromise in every line. They are, indeed, chiefly negative,

condemning the errors of the mediæval church and those of certain of the Protestant sects. They are, on the whole, Calvinistic in tone, but their extreme elasticity has been well shown by Newman and Jowett. The former of these, in the famous *Tract XC.*, attempted to prove that they were in no way contrary to the Decrees of Trent. Commentaries are those of Beveridge (1716), and Harold Browne (1850). See W. H. G. Thomas, *The Principles of Theology, an Introduction to the Thirty-Nine Articles*, 1930.

Thirty Years' War. The. Practically it may be said that the T. Y. W. was the result of the Ger. Reformation and the Counter-Reformation. The war began in 1618 by the offer of the crown of Bohemia to the Lutheran prince, the elector of the Palatinate, son-in-law of James I. of England and father of the Princes Rupert and Maurice. The troops of the Emperor immediately entered Bohemian territory and drove Frederick out, depriving him also of his electorate of the Lower Palatinate, a task rendered more easy by the inactivity of James I. of England. The territories so annexed by the Emperor Ferdinand were handed over to Maximilian of Bavaria and so became Catholic; an illustration merely of the sixteenth-century principle that the religion of the prince is also the religion of his subjects. The Hapsburgs now developed their policy on larger lines; Germany was to become a Hapsburg possession and the territory lost to Catholicism by the Reformation was to be regained. The imperial generals, Tilly and Wallenstein, swept all before them; N. Germany and the Baltic ports seemed to lie at their mercy. Christian IV. of Denmark came forward as the champion of Ger. Protestantism, but was defeated and forced to make peace in 1629 (Lübeck). Wallenstein had established the Hapsburg supremacy in the N., but had failed to take Stralsund. In the following year Gustavus Adolphus, aided by Fr. subsidies, came forward as the champion of Protestantism, and with his appearance we get the beginning of the end. Wallenstein had been dismissed at the Diet of Ratisbon; the Ger. princes feared the man whom they regarded as a mere mercenary upstart. Gustavus Adolphus marched from victory to victory. Tilly was defeated at Breitenfeld, and Gustavus marched to the S. In 1631 he again defeated, and killed, Tilly at Lech, and then Wallenstein was recalled. Gustavus won the Battle of Lützen (1632), but was killed, and much of his work was undone. From this point the religious motives

of the war entirely disappear. France, anxious to break the power of the Hapsburgs, gave support to the Swedes and Ger. Protestant princes. Richelieu played his hand well; enemies to the Hapsburgs were raised up in Germany, Italy, and Spain; the Dutch were given support in their struggle against Spanish power; and the power of the Hapsburgs, both Austrian and Spanish, began to decline. The policy of Richelieu was continued after his death by Mazarin, and the Fr. generals Condé and Turenne won brilliant victories over the imperialists. Finally the end came in 1648, when the Emperor, suffering from defeats in Germany at the hands of the Swedes and the Fr., agreed to terms of peace. Peace was signed at Westphalia in 1648 (Oct.). The territorial gains of France and Sweden were recognised, and the independence of the Ger. princes. The attempted revival of the power of Catholicism by the sword had failed, and the imperial power became nominal elsewhere than in Austria. The independence of Portugal and the United Provinces (Holland) was also recognised by this treaty. See S. R. Gardiner, *The Thirty Years' War*, 1898 (11th ed.); H. G. R. Reade, *Sidelights on the Thirty Years' War*, 3 vols. 1925.

Thisbe, see PYRAMUS AND THISBE.

Thistle, a name given to various composite plants of which the best known are those that belong to the genera *Carduus* and *Cnicus*. Others



THISTLE

are the Scottish T. (*Onopordon acanthium*); the Carline T. (*Carlina vulgaris*); the Globe T., which belongs to the genus *Echinops*; and the Hedgehog T. (*Echinocactus*). The Holy T. is *Silybum marianum*. Its roots and young leaves are edible.

Thistle, Order of the, *see* ORDERS OF KNIGHTHOOD.

Thistleton-Dyer, Sir William Turner, *see* DYER.

Thistlewood, Arthur (1772-1820), a conspirator, was a reformer who sought to achieve his ends by the use of violence. His project in 1820 to assassinate the cabinet ministers when gathered together at dinner at Lord Harrowby's house in Grosvenor Square failed owing to one of the body giving away the secret. T. and his associates were caught in a loft in Cato Street, London, and the attempt became known as the Cato Street Conspiracy (*q.v.*). T. was tried for high treason, and hanged.

Thistlewood Conspiracy, *see* CATO STREET CONSPIRACY.

Tholuck, Friedrich August Gottreu (1799-1877), a Ger. theologian and preacher, b. at Breslau, and studied in his native city and at Berlin. Here he came under Neander's influence, and in 1824 succeeded De Wette as professor of Oriental languages. In 1826 he went to Halle as professor of theology, and here, except for one interval, he remained for the rest of his life. His work is marked by pietism, eclecticism, and suggestiveness. His works consist chiefly of commentaries and sermons, certain works on church history, *Die wahre Weihe des Zweiglers* (1823), and *Anachissstunden* (Eng. trans. 1875).

Thomas, a tn. of Portugal. Here are ruins of a Templar's castle; also the famous convent of the Order of Christ. There are gold mines in the vicinity. Pop. 37,176.

Thomas, one of the twelve disciples, called also Didymus (John xi. 6), a Gk. translation of the Hebrew form of 'Thomas.' All the information about him in Scripture is given in the Fourth Gospel. Later tradition says that he evangelised India and Parthia, dying at Edessa.

Thomas, Albert, Fr. statesman; b. June 16, 1878, at Champigny-sur-Marne; son of a baker. Educated: Lycée Michelet; Higher Normal School. Became tutor to a great-grandson of Victor Hugo, whose family owned steel-works on the Loire, where T. gained knowledge of manufacture of steel. By means of scholarships, he travelled in Germany and Russia. In 1904, when Jaurès founded *L'Humanité*, T. became assistant-editor. Was at one time mayor of Champigny. Elected to Chamber for Secaux, as a Socialist, 1910; opposed the Three-Years Bill, and was considered a pacifist. Reporter to State Railways Commission when Great War began; joined his regiment of infantry. Recalled from fighting line to Bor-

deaux, Sept. 1914, for munition-work. Millerand gave him an under-secretaryship of state, May 1915; he retained this under Ribot. In April 1917 he was sent to Russia to confer with Kerensky. Well known in London during War. In 1910, changed seat, became deputy for Tarn. Director, International Labour Office, since its formation, Oct. 1919. Ceased to be a deputy in 1921, as his directorship absorbed all his time. Publications: *Le Syndicalisme Allemand*, 1903; vol. on Second Empire in Jaurès' *Histoire Socialiste*, 1908; *Histoire Anecdote du Travail*, 1910.

Thomas, Arthur Goring (1850-92), an Eng. musical composer, b. at Ratton Park, Sussex, and studied in Paris and at the Royal Academy, London, under Prout and Sullivan. He wrote *Emeralda*, *The Sun Worshippers*, *The Swan* and *The Skylark*, and a number of songs. He committed suicide.

Thomas, Augustus, American dramatist, b. at St. Louis, Missouri, Jan. 8, 1857. He was educated in the St. Louis public schools, and studied law for two years. For six years he worked in railway freight departments, and then became a writer and illustrator on St. Louis, Kansas City, and New York papers. For a time he was editor and owner of the *Kansas City Mirror*. Branching out as a playwright, he won American fame and fortune with his plays—*Alabama*, *In Mizoura*, and *Arizona*. He has since written more, but none which won the public favour like those mentioned. He was President of the National Institute of Arts and Letters, 1914-16, and that organisation awarded him its gold medal for his work in drama. Also President of the Society of American Dramatists from 1906 to 1911.

Thomas, Bertram, British explorer and Orientalist, b. June 13, 1892. Was Finance Minister and Wazir to the Sultan of Muscat for some years. His crossing of the Rub' al Khali, the great desert of Southern Arabia, one of the largest unknown regions in the world, in the winter of 1930-31, is one of the greatest feats of exploration of the present century. His actual route was from Dhufar on the Arabian sea-coast to Dohah on the El Qatar peninsula in the Persian Gulf. No European had previously crossed this desert, which extends 650 m. from N. to S. and 550 m. from E. to W. and is a byword even to the Arabs throughout the peninsula. Crossings by car and aeroplane have often been considered, but T. went with a camel caravan. He was awarded the Founders'

Medal of the Royal Geographical Society and the Burton Memorial Medal of the Royal Asiatic Society. Previously, in 1927-28, he had made a 600-m. journey through the southern borderlands from the toe of Arabia nearest India to Dhufar, and in 1929-30 he explored the steppe for 200 m. to the northward of Dhufar, right to the edge of the sands. On these occasions he dressed as a Badu, spoke the local dialect, and lived as one of the people, to win the fair name that would ultimately help him in the crossing of the Rub' al Khali. The scientific results of his expedition have been acclaimed by the leading natural history, geographical, and anthropological authorities in this country. Published *Alarms and Excursions in Arabia*, 1931; *Arabia Infelix*, 1932.

Thomas, George (c. 1756-1802), an Irish adventurer who rose to be an independent ruler in India; b. in Tipperary and entered the navy, but deserted at Madras and served native princes, distinguishing himself against the Sikhs and the Fr. He was unable to keep the position he gained, being captured and escorted to the British frontier with the fortune he had amassed. He d. on the journey to Calcutta.

Thomas, George Henry (1816-70), an American general, b. in Southampton co., Virginia, and educated at West Point Military Academy. He served in the Seminole War and the Mexican War, and was instructor at West Point from 1851 to 1854. In 1861 he was appointed colonel, and later brigadier-general, of volunteers. In 1862 he gained the victory of Mill Springs, and distinguished himself at Perryville, Murfreesboro, and Chickamauga. He was made commander of the army at Cumberland, and fought the Battle of Chattanooga in 1863, whilst in 1864 he defeated Hood at Nashville. In 1865 he was made major-general.

Thomas, Rt. Hon. James Henry, British Labour politician; b. Oct. 3, 1875, at Newport, Mon. Began work at nine as an errand-boy; then an engine-cleaner on the G.W.R.; fireman; engine-driver. Elected to town-council of Swindon, Wilts; chairman of its finance committee and its electricity and tramways committee. President of Amalgamated Society of Railway Servants, 1910. A supporter of 'all-grades' as against 'craft' trade-unionism. M.P. for Derby since 1910. P. C., 1917. General Secretary, National Union of Railwaymen, 1918-24, and 1925-31. President and chairman, Parliamentary Committee of Trades Union Congress, 1920-21. President

International Federation of Trades Unions, 1920-24. Vice-chairman, Parliamentary Labour Party, 1921. Secretary of State for Colonies, 1924. Lord Privy Seal and Minister for Employment, 1929-30, and later Secretary of State for Dominion Affairs and Secretary of State for the Colonies. In the financial crisis of the summer of 1931, T. was faced with the alternative either of supporting Mr. Ramsay MacDonald's 'National Gov.' in the economy proposals—which up to a point had been accepted by the whole Labour Cabinet prior to its resignation—or of remaining with the Labour Party, which, at the instance of the Trades Union Congress, declined any longer to support Mr. MacDonald. T. supported the proposals and resigned his post of secretary of the National Union of Railwaymen, his choice resulting in the loss of his pension rights in the Union. In the ensuing election of Oct. 1931 his constituency returned him by a majority of over 27,000. Publications: *When Labour Rules*, 1920; *The Red Light on the Railways*, 1921.

Thomas à Kempis (c. 1379-1471), an Augustinian canon and religious writer, called after his birthplace Kempen, near Düsseldorf. His surname was Hammerken, and he came of a peasant family. At ten he was sent to a school at Deventer, where the influence was strongly religious, and, having been convicted of sin in a vision, he decided to enter a holy order. In 1399 he was admitted into the Augustinian convent of Mount St. Agnes at Zwolle, and took the vows in 1406. He lived a peaceful and secluded life in this convent, devoting his time to copying manuscripts and to writing his own books. These latter included sermons, some hymns, and a great number of pious tracts. He wrote biographies of Gerhard Groot, the founder of the school at Deventer; Florentius Radewyn, a former master of his, and of Groot's early disciples. His tracts, which deal with the monastic and Christian life, include: *The Discipline of Cloisters*; *The Life of the Good Monk*; *The Solitary Life*; *The Valley of Lilies*; *The Soul's Soliloquy*; *The Garden of Roses*; and *The Faithful Dispenser*. By far the most celebrated of his treatises is the famous *Imitatio Christi*, which has been translated into more languages than any other book except the Bible. Within ten years of a K.'s death there had been published eighty editions of this book. Two manuscript copies, dated 1425, exist, but a more perfect copy is in the Bourgogne Library at Brussels. The earliest Eng. trans-

lation, now in Magdalen College, Oxford, is that of Pynson, which is dated 1438. An interesting literary controversy has raged around the authorship of the *Imitation*, the other claimants put forward being John Gerson, chancellor of the University of Paris, and the abbot of Vercelli, but the learned, as well as the popular, verdict is in favour of the traditional authorship of à K. The *Imitation* breathes out the quiet and peace of the cloister, and with its combination of simple faith and mysticism appeals to all manner of men and women. Apart from the doctrine of transubstantiation, which is upheld in the fourth book, its teaching is accepted by Christians of all creeds. The work has, too, great literary beauty, and, as pointed out by Dr. Hirsche, in its original form has most harmonious cadences and a rhythmical flow. The 'rhythmic sentences' are preserved in Canon Liddon's translation (1889). The *editio princeps* is that of Sommoelius, *Thomas Malleoli à Kempis opera omnia*, 1607. Consult M. de Grégory, *Mémoire sur le véritable Auteur de l'Imitation*, 1830; Kettlewell, *Authorship of the De Imitatione*, 1877, and *Thomas à Kempis and the Brothers of the Common Life* (from the Rom. Catholic standpoint), 1882; Hirsche, *Prolegomena zu der Imitatio*, 1873-74; Eng. translations by Bishop Goodwin, 1868, and C. Bigg, 1898; Brewer's *Life*, 1676; F. R. Cruise, *Thomas à Kempis* (from Protestant standpoint), 1887, *Outline of the Life of Thomas à Kempis*, 1904; Montmorency, *Thomas à Kempis: His Age and Book*, 1906; and James Williams, *Thomas of Kempis*, 1910. There is also a new critical edition by J. Pohl. A bibliography may be found in Wolfsgruber *Giovanni Gersen*, 1880.

Thomas, Philip Edward (1878-1917), Eng. author of Welsh extraction; b. March 3, in London; eldest son of Philip Henry T., staff-clerk at Board of Trade. Educated at St. Paul's School; Lincoln College, Oxford. Enlisted, 1915. Second-lieutenant, R.G.A.; killed at Arras, April 9, 1917. Much of his prose is lost in newspapers, but in his best work the qualities revealed are truth and a love of the countryside of England and Wales. Because of the honesty of his thought and writing his essays are not always easy reading, nor did he concern himself with plot and invention. Imagination, having the quality of mysticism, was, however, a characteristic of his prose. Although T. became a soldier, his writings during the War, which include *The Last Sheaf*, pub. in 1928, never degenerated into blatant patriotism. His poetry,

the late flower of his literary work and written for his own delight, is perhaps his greatest gift to literature. The verse is clear in colour and content and English in the tradition of 'Clare, Cobbett, Moreland and Crone.' Two of his best poems are *Lights Out* and *Out in the Dark*. Works include: *The Woodland Life*, 1897; *Oxford*, 1903; *Beautiful Wales*, 1905; *Richard Jefferies*, 1909; *The South Country*, 1909; *Rest and Unrest*, 1910; *Feminine Influence on the Poets*, 1910; *Light and Twilight*, 1911; *George Borrow*, 1912; *Swinburne*, 1912; *Walter Pater*, 1913; *The Happy-go-Lucky Morgans* (novel), 1913; *In Pursuit of Spring*, 1914; *Collected Poems*, 1920. His life is the subject of two unorthodox and beautifully-written books by his wife, Helen Thomas—*As it Was* (1926) and *World Without End* (1931).

Thomas, Sidney Gilchrist (1850-85), a British inventor, b. at Canonbury, London. He became a police-court clerk, but studied chemistry in his leisure, and attended the Birkbeck Institute lectures. He solved the problem of the dephosphorisation of iron, and with his cousin, Gilchrist, took out patents. See *Memoirs and Letters*, ed. R. W. Burnie, 1891.

Thomas, Christians of St., the oldest Christian church of India, is Nestorian in doctrine, and probably owes its origin to the Nestorians of Persia. Tradition, however, ascribes it to St. Thomas. From 1599 to 1653 they were brought under Rom. jurisdiction, but they now claim entire independence. They number a few hundred thousand and are found in the states of Malabar and Cochin. The liturgical language is Syriac. See G. M. Rae's *Syrian Church in India*, 1892.

Thomas à Becket or Thomas Becket, see BECKET, THOMAS A.

Thomas Aquinas, see AQUINAS, THOMAS.

Thomasius, Christian (1655-1728), a Ger. jurist, b. Leipzig, where he began to lecture on law in 1684. He removed to Halle (1690), where he founded a university (1694).

Thomas of Celano, composer of the Latin hymn, *Dies Irae* (q.v.). He was a Franciscan friar probably in the company of St. Francis of Assisi during the thirteenth century. He wrote the life of St. Francis of which an edition by E. d'Alençon was pub. in 1906 and an English trans. by A. G. F. Howell in 1908.

Thomas of Woodstock, see GLOUCESTER, DUKES AND EARLS OF.

Thomas the Rhymer, see ERCILDOUNE, THOMAS OF.

Thompson, Elizabeth and Alice, see BUTLER, ELIZABETH SOUTHERDEN, LADY; and MEYNELL, ALICE.

Thompson, Francis (1860-1907), an Eng. author, *b.* at Preston, Lancs. He was educated at Ushaw College, near Durham, and afterwards studied medicine at Owens College, Manchester, but failing to take a degree he sought his fortune in London.



[Courtesy of Burns Oates & Washbourne]

FRANCIS THOMPSON

Here he spent some years in various occupations, until in 1893 he sent a poem to the magazine *Merrie England*. This was at once recognised by Wilfrid Meynell as a work of merit, and he helped Thompson to publish his first volume of *Poems*, which were praised by Coventry Patmore in the *Fortnightly Review*. This volume was followed by *Sister Songs* (1895) and *New Poems* (1897), both of which gave him a recognised place among poets. He also gained a reputation as a prose writer, and published *Health and Holiness*, a treatise dealing with the ascetic life, and an *Essay on Shelley*, amongst other works. *The Works of Francis Thompson* in three volumes were pub. in 1913; *Collected Poetry* in 1924. See J. Thomson, *Francis Thompson, Poet and Mystic*, 1923; Everard Meynell, *The Life of Francis Thompson*, 5th ed. rev., 1926; R. L. Megroz, *Francis Thompson, Poet of Earth in Heaven*, 1927.

Thompson, Sir Henry (1820-1904), an Eng. surgeon, *b.* at Framlingham, Suffolk. He studied at University College, London, and in 1863 became surgeon there, being appointed professor of clinical surgery in 1866, and consulting surgeon in 1874. He was also professor of surgery and pathology in the Royal College of Surgeons. He was an

advocate of cremation, and wrote: *Pathology and Treatment of Stricture of the Urethra*; *The Enlarged Prostate*; *Food and Feeding*; *Modern Cremation, its History and Practice*.

Thompson, Sir John Sparrow (1844-94), a Canadian statesman, *b.* at Halifax in Nova Scotia, where in 1877 he entered the House of Assembly. In 1878 he was made Attorney-General, and in 1881 Premier, but his administration lasted only a year. He was a judge of Nova Scotia Supreme Court from 1882 till 1885, when he entered the Dominion House of Commons and became Minister of Justice. From 1892 till his death he was Prime Minister of Canada.

Thomsen, Hans Peter Jorgen Julius (1826-1909), a Danish chemist, passed his life in Copenhagen, teaching chemistry at the Polytechnic (1847-56) and Military High School (1856-66), before he was appointed to the chair of his science in the University (1866-91). *Thermochemistry* (1908) is an abstract of his *Thermochemische Untersuchungen* (1882-86).

Thomson of Cardigan, Christopher Eirdwood Thompson, 1st Baron (1875-1931), Eng. soldier and Labour politician, *b.* April 13; son of Maj.-Gen. David T. Educated at Cheltenham Coll. and R. Military Academy, Woolwich. Attained rank of brigadier-general in the Great War, and afterwards wrote articles of a polemical character in the Labour interest. Military attaché-in-chief on Military Commission to Rumania, 1915-16; on the Supreme War Council, 1918-19. Twice unsuccessfully contested seats as a Labour candidate. Became a member of the Labour Cabinet of 1924 and was raised to the peerage. Secretary of State for Air 1924 and again 1929-31. Killed in the R101 disaster. See AIRSHIPS. Publications: *Old Europe's Suicide*; *Smaranda*, 1926; *Air Facts and Problems*, 1927.

Thomson, Sir Charles Wyville (1830-82), a Scottish naturalist, occupied several professorial chairs, the last being that of natural history at his own University of Edinburgh (from 1870 onward). In 1868 and 1869 he went on deep-sea dredging expeditions, and in 1872-76 superintended the scientific staff on board the *Challenger* during the deep-sea explorations.

Thomson, Elihu, famous electrician, was *b.* in Manchester, England, March 29, 1853, and moved to the U.S.A. with his parents while a child. He was educated at the Central High School in Philadelphia. From 1875 to 1880 he was professor of mechanics and chemistry at this institution. Since 1880 he has been chief electrician for the Thomson-Houston Co. and

the General Electric Company, which under his inventions operate more than 600 patents. Besides numerous inventions in electric lighting and dynamo making, he is the discoverer of the method of electrical welding. He has been presented with medals by most of the great societies of the world, among them the Rumford medal in 1902, the Hughes medal of the Royal Society in 1916, the Kelvin medal in 1924, the Franklin medal in 1925, and the Faraday medal, 1927.

Thomson, James (1700-48), a Scottish poet, b. at Ednam in Roxburghshire, was educated at Edinburgh University, where he occupied his leisure in writing great quantities of verse, of which three poems appeared in the *Edinburgh Miscellany* of 1720. He had originally some intention of entering the ministry, but he abandoned all thought of this, and in 1725 went to London to pursue a literary career. He became tutor to Thomas Hamilton (afterwards seventh Earl of Haddington), and made the acquaintance of many of the leading men of letters. He published in 1726 *Winter*, which was highly applauded, and this he followed in the next year with *Summer*. *Spring* appeared in 1728, and two years later he republished these three poems, adding to them *Autumn*, under the title of *The Seasons*. He subsequently carefully revised this work, but it was not brought out in its amended form until 1744. T. in 1730 had his play *Sophonisba* produced at Drury Lane, but in spite of its many merits it was not successful. *Liberty* (1734) and *Agamemnon* (1738) were his next works, and in 1740 he wrote *The Masque of Alfred*, which is famous because therein first appeared *Rule Britannia*. Since 1738 T. had been in receipt of a pension from Frederick, Prince of Wales, and in 1744 was given by Lyttelton the sinecure office of surveyor-general of the Leeward Is. His later works include the play *Tancred and Sigismunda* (1745), in which Garrick played Tancred, and *The Castle of Indolence* (1748). He was buried in Richmond Church. When T. began to write, Eng. poetry was dominated by artificiality, and Pope was the principal living poet; but T. introduced the true, simple, romantic treatment of nature, and his influence on his contemporaries, as on his successors, was unbounded. T.'s *Works* were first collected in 1763, and have since been frequently reprinted. There are numerous biographies, including those of Shiels (1753), Dr. Johnson (1781), and G. C. Macaulay (1908). The Oxford Edition of the poetical works is by J. L. Robertson.

Thomson, James (1822-92), a British physicist, was also an engineer, inventor, and geologist. He was professor of civil engineering at Belfast (1857-73) and Glasgow (1873-89), and was the first to demonstrate the possibility of lowering the freezing-point of water, etc., by pressure.

Thomson, James (1834-82), a Scottish poet, was in early life an army schoolmaster, but was dismissed for a breach of discipline in 1862. His best work, contributed as by 'B. V.' (Bysshe Vanolis), *The City of Dreadful Night*, appeared in the *National Reformer* during the spring of 1874, and was published in book form six years later. There is a Biography by H. S. Salt, 1905.

Thomson, Sir John Arthur, British naturalist; b. July 8, 1861, in East Lothian. Educated: Universities of Edinburgh, Jena, and Berlin. Sometime lecturer in zoology and biology, School of Medicine, Edinburgh. Regius professor of natural history, Aberdeen, 1899-1930. Also author of: *Study of Animal Life*, 1892 (rev. 1917); *Herbert Spencer*, 1906; *Darwinism and Human Life*, 1910 (rev. 1916); *Biology of Birds*, 1923; *Science and Religion*, 1925; *Outline of Biology*, 1930. Knighted, 1930.

Thomson, Joseph (1858-95), a Scottish explorer in Africa; was left in 1879, after Keith Johnston's death, in sole charge of an expedition to E. Central Africa. In his book entitled *To the Central African Lakes and Back* (1881) he described the new track he found between lakes Nyasa and Tanganyika and his discovery of Lake Rukwa. His *Through Masailand* (1885) is a record of a caravan journey through that country—the first ever undertaken. In 1890-91 he traversed nearly 1000 m. of the then unknown country now called N.E. Rhodesia.

Thomson, Sir Joseph John, British physicist; b. Dec. 18, 1856, near Manchester; eldest son of J. J. Thomson. Educated: Owens College; Trinity College, Cambridge. Second Wrangler and second Smith's prizeman, 1880. Lecturer, Trinity College, 1883. Cavendish Professor of Experimental Physics, Cambridge, 1884-1918. Lectured in American universities at different times. Has notably developed theories of electricity and radioactivity. Knighted, 1908. P.R.S., 1916-20. Master of Trinity College, Cambridge, since 1918. Some of his publications: *On the Motion of Vortex Rings*, 1883; *Application of Dynamics to Physics and Chemistry*, 1888; *Elements of the Mathematical Theory of Electricity and Magnetism*, 1895; *Corpuscular Theory of Matter*, 1907; *Thermo-*

chemistry, 1915; *The Electron in Chemistry*, 1923.

Thomson, William, see KELVIN, LORD.

Thor, god of thunder, see MYTHOLOGY.

Thoracic Duct, a duct which conveys the greater part of the lymph and chyle into the blood. It is the common lymph trunk of the body except for the right upper extremity, right side of the head, neck, and thorax, right lung, right side of the heart, and convex side of the liver. It does not, as its name would seem to imply, lie wholly within the thoracic cavity, but begins in the abdomen, on the front of the body of the second lumbar vertebra, by a dilatation known as the receptaculum chyli. It reaches the thorax by passing through the aortic opening in the diaphragm, passes upwards to the root of the neck, and then takes a curved course outwards and downwards, emptying itself into the left subclavian vein at its junction with the left internal jugular vein. The duct measures, in the adult, between 15 and 20 in. in length.

Thorax, in anatomy, the upper portion of the trunk, being contained between the diaphragm below, the ribs and sternum in front, the ribs and part of the vertebral column behind, and the base of the neck above. See CHEST.

Thorbecke, Jan Rudolf (1798-1872), a Dutch statesman; went to Leyden University in 1817, and was called to the Bar in 1820. After the publication of his *Annotations on the Constitution* (1839), he became the recognised leader of the new reform party. He was a real political force, besides being an accomplished orator and author, and helped largely to shape the constitution finally adopted in 1887.

Thoreau, Henry David (1817-62), an American naturalist and author. He was b. at Concord, Mass., on July 12, and was of mixed Scottish and French descent. 'His character,' says Emerson, 'exhibited occasional traits drawn from this blood [French] in singular combination with a very strong Saxon genius.' T. passed through school and Harvard University without gaining any distinction. The two famous years of his life were those he spent as a recluse in his self-made shanty in the woods near Walden Pond (1845-47), and it is his *Walden* (1854) which reveals to the world the curious and arresting originality of the man. Here he lived happily on a bare pittance, indulging to the full his sympathies with bird and beast, and giving free rein to his fresh and noble but rather

egoistic thoughts. Other facts of interest in his life are his intimacy with Emerson, the diversity of his callings, and his contempt for work and wealth. Other writings are *A Week on the Concord*, 1849; *Excursions*, pub. posthumously, 1863; *The Maine Woods*, 1864; *Cape Cod*, 1865. The Standard Edition is the Riverside, 10 vols. 1894, 1895. See H. A. Page, *Thoreau, his Life and Aims*, 1878; also *Lives* by F. B. Sanborn, 1882; H. S. Salt, 1890; J. B. Atkinson, *Henry Thoreau, the Cosmic Yankee*, 1928. *Walden* is reprinted in Everyman's Library and *A Week on the Concord* in the Open-air Library.

Thorium, a metallic element, symbol Th, atomic weight 232.2, atomic number 90. T. was discovered by Berzelius in 1828, and is obtained commercially from the monazite sand of Brazil, Malay, etc. Thorium oxide, ThO₂, is extracted from the sand, and is used in the preparation of incandescent gas-mantles. Metallic T. is difficult to isolate, owing to its chemical activity, but it has been prepared pure by strongly heating thorium chloride with sodium in a vacuum. It is a greyish metal, melting at over 1800° C. When heated in air or oxygen it burns brilliantly. T. is radioactive, thorium atoms gradually disintegrating to mesothorium, thorium-x, thorium emanation, and so on, to a final product not hitherto identified.

Thorn, or Torun, a tn. on the Vistula, 26 m. E.S.E. of Bromberg, in the co. of Pomorze, Poland, formerly in W. Prussia, Germany. Since 1878 it has been converted into a first-class fortress, as it commands a viaduct over the river. In 1853 a monument was erected to Copernicus, who was a native of the town. Timber, cereals, and iron are the chief articles of commerce. Pop. 39,300.

Thornaby-on-Tees (known as South Stockton prior to 1892), a municipal bor. in the N. Riding of Yorkshire, England, opposite Stockton, and 3 m. S.W. of Middlesbrough. The iron industry is of first importance. Pop. (1931) 21,233.

Thorn Apple, see DATURA.

Thorndike, Edward Lee, b. at Williamsburg, Mass., U.S.A., Aug. 31, 1874. Educated at Wesleyan, Harvard, and Columbia Universities. He became instructor in teaching at Western Reserve University, 1898-99 and in psychology, 1899-1901. Since 1904 he has been professor of psychology in the teachers' college at Columbia University. Among his best-known books are *Educational Psychology*, 1903; *Mental and Social Measurements*, 1904; *Animal Intelligence*, 1911.

Thorndike, Dame Sybil (Mrs. Lewis Thomas Casson), Eng. actress; *b.* Oct. 24, 1882, at Gainsborough, Lincs; daughter of Arthur John Webster T., hon. canon of Rochester. From infancy lived in Rochester. Educated Rochester High School. Became good pianist; performed at London concerts when a schoolgirl; but strained wrist. Family then lived at Aylesford on Medway; with her brother, she joined Ben Greet's Academy. Toured with Ben Greet's Co. in America four years. Miss Horniman's Manchester Co., 1908-09. Married, 1908. Chas. Frohmann repertory, 1910. American tour with John Drew, 1910-11. Leads, Horniman Co., 1911-13. Shakespeare leads, Old Vic, 1914-18. Little Theatre, 1920-22. While managing New Theatre, original Joan of Arc in Shaw's *St. Joan*, 1924. D.B.E., June 1931.

Thorne, a market tn. and rural district on the Don, with barge-building and rope-making industries, in the W. Riding of Yorkshire, Eng. Pop. of rural district (1931) 31,154; area, 38,419 ac. Pop. of tn. about 7000.

Thornhill: (1) A suburb with woollen and shoddy mills, S. of Dewsbury, in the W. Riding of Yorkshire, England. (2) A picturesque vil. with ruins in the neighbourhood in Dumfriesshire, Scotland. Pop. 1000.

Thornhill, Sir James (1676-1734), *b.* at Weymouth. He received the commission from Queen Anne to paint the interior of the cupola of St. Paul's Cathedral, and afterwards to paint the princess's apartment at Hampton Court. Sir James executed many other large works, as the staircase, the gallery, and several ceilings in the palace at Kensington, a hall at Blenheim, and (with some assistance) the great hall at Greenwich Hospital; also several portraits and some altarpieces. He was a fellow of the Royal Society, and represented Weymouth in parliament.

Thornton: A vil. 4 m. S. of Fleetwood, on the Wyre, in Lancashire, England. It is now joined with the seaside resort of Cleveleys to form the urban dist. of Thornton Cleveleys. Pop. (1931) 10,144.

Thornycroft, Sir John Isaac (1843-1928), Eng. naval architect; *b.* Feb. 1, in Rome; eldest son of Thomas and Mary T., sculptors. Draughtsman, Palmer's shipbuilding yard. In Glasgow: learned from Lord Kelvin and Macquorne Rankine at univ.; worked for John Elder, marine engineer. Established at Chiswick, 1866, yard for launches and torpedo-craft. Built first torpedo-boat of Brit. Navy, 1877. In 1898 began motor-building at Basingstoke. Boatyard removed to Woolston, South-

ampton, 1906. Supplied Admiralty during Great War. F.R.S. 1893. Kt., 1902. Died at Steyne, Bembridge, I.W., June 28.

Thornycroft, Sir William Hamo (1850-1925), Eng. sculptor; *b.* March 9, in London; younger brother of Sir John Isaac T., *q.v.* Educated: Macclesfield Grammar School; Univ. College School, London. Helped father with Park Lane Fountain, 1872—contributed Comedy, Shakespeare, and Fame. Won R.A. gold medal, 1875: 'Warrior bearing wounded youth.' Other works: 'Lot's Wife,' 1878, 'The Mower' in Walker Art Gallery, Liverpool; statue of Cromwell (in front of the Houses of Parliament) and busts of Q. Victoria, General Gordon; Gordon's statue in Trafalgar Sq.; Gladstone Memorial, Strand; Lord Curzon Memorial, Calcutta. R.A., 1888. Knight, 1917. Died at Oxford, Dec. 18.

Thorough Bass, a term used for the science of harmonic composition. It is sometimes called *figured bass*, a bass voice part written with numerals below it to indicate the chords of the harmony.

Thorwaldsen, Bertel (1770-1844), a Danish sculptor. The son of a wood-carver, he was *b.* at Copenhagen and studied for a while in the school of art there; subsequently he went to Italy, where he was influenced by Canova. Soon after his death a permanent exhibition of his work was formed at Copenhagen, while his statue of Byron is now at Trinity College, Cambridge. See Eugene Plon, *Thorwaldsen* (Paris), 1880.

Thoth, an Egyptian deity, resembling the Gk. god Hermes, and later identified with Hermes Trismegistus. He was the god of magic, science, and invention, and taught man how to write and calculate. He is represented with the head of an ibis, this bird being sacred to him.

Thothmes, or **Tethmosis**, the name of four kings of anct. Egypt, who belong to the 18th dynasty: *Thothmes I.* (c. 1540 B.C.) finally subdued and enlarged Cush and made successful campaigns as far as the Euphrates. He was the first king to be interred in the Valley of the Tombs of the Kings of Thebes. *Thothmes II.*, his son, reigned less than three years. *Thothmes III.*, the son of Thothmes II., did little till the death of his stepmother and aunt, the despotic Queen Hatshepsut. Besides fighting seventeen successful campaigns in Syria and twice capturing Kadesh, he proved a great builder and administrator. *Thothmes IV.* was a grandson of Thothmes III., and ruled till about 1400 B.C.

Thou (or **Thuanus**), **Jacques Auguste de** (1553-1617), a Fr. historian, b. at Paris. He became a canon of Notre Dame in Paris, but he gave up an uncongenial profession, and by 1588 was president of the parlement of Paris, and in great favour with Henry III. He wrote a *Historia sui temporis* in 138 books (1604-20), which is an invaluable historical document. See *Lives* by Dupuy (1669) and J. A. M. Collinson (1807).

Thouars, a tn. in the dept. of Deux-Sèvres, France, on R. Thouet. Parts of the mediæval walls are standing, and there are old churches and a castle. There is an active trade in grain, wine, oil, etc. Pop. 8181.

Thought Reading, see **PSYCHICS** or **PSYCHICAL RESEARCH**.

Thourout, a tn. of Belgium, in the prov. of W. Flanders. It holds large horse fairs. Pop. 10,578.

Thousand and One Nights, see **ARABIAN NIGHTS**.

Thousand Islands, the name given to a lake-like expansion of the St. Lawrence R., stretching from Kingston to Brockville, so called from the hundreds of islands which add peculiar charm to the scenery.

Thracia, was in earlier times the name of the vast space of country bounded on the N. by the Danube, on the S. by the Propontis and the Egean, on the E. by the Pontus Euxinus, and on the W. by the R. Strymon and the easternmost of the Illyrian tribes. It was divided into two parts by Mt. Hæmus (the *Balkan*), running from W. to E., and separating the plain of the lower Danube from the rivs. which fall into the Egean. At a later time the name Thrace was applied to a more limited extent of country. Thrace, in its widest extent, was peopled in the times of Herodotus and Thucydides by a vast number of different tribes. The earliest Gk. poets, Orpheus, Linus, Musæus, and others, are all represented as coming from Thrace. The Thracian Chersonesus was probably colonised by the Gks. at an early period, but it did not contain any important Gk. settlement till the migration of the first Miltiades to the country, during the reign of Pisistratus. The first really historical fact respecting the Thracians is their subjugation by Megabazus, the general of Darius. After the Persians had been driven out of Europe by the Gks., the Thracians recovered their independence; and at the beginning of the Peloponnesian War, almost all the Thracian tribes were united under the dominion of Sitalces, king of the Odrysæ, whose kingdom extended from Abdera to the Euxine and the mouth of the Danube. Sitalces fell in battle against

the Triballi in 424, and was succeeded by his nephew Seuthes, who raised his kingdom to a height of power and prosperity which it had never previously attained. Philip, the father of Alexander the Great, reduced the greater part of Thrace; and after the death of Alexander the country fell to the share of Lysimachus. It subsequently formed a part of the Macedonian dominions. Recently T. has again been the centre of disturbances. It was one of the three theatres of war in the Balkan War of 1912, when the Bulgarians entered it and defeated the Turks. With the help of the Serbs, Bulgaria took Adrianople, and nearly all T. was given to Bulgaria by the Treaty of London signed in 1913. However, quarrels with her allies about the division of the conquered territories led to the second Balkan War in 1913, when the Turks recaptured Adrianople and reoccupied Thrace. The treaty of Sept. 1913 gave Bulgaria her outlet to the Egean Sea through Thrace. In 1919, after the Great War, the boundary was again changed, and the sea coast given to Greece, which obtained most of Thrace by 1920. In 1923, the Treaty of Lausanne provided for the giving up of Eastern Thrace up to the Maritza to Turkey, and Western Thrace, except Karagach, was given to Greece. Eastern Thrace was ruled by the Angora Gov. of Turkey from 1923 to 1927, when Mustapha Kemal Pasha became president of the Turkish Republic. Western Thrace was not included in the exchange of Turks in Greece with Gks. in Turkey. Thrace is in a primitive condition, but the Turkish Gov. is trying to improve matters, and recently established a modern sugar factory, and encourages modern methods of cheese manuf. See *Treaty of Peace with Turkey—signed at Lausanne, July 24th, 1923*, 1923; F. Schevil, *The Balkan Peninsula*, 1922; A. J. Toynbee, etc., *The Balkans*, 1915.

Thrale, Mrs., see **Piozzi**.

Thrasea, **P. Pætus** (d. A.D. 66), a Rom. senator and Stoic philosopher in the reign of Nero, a native of Patavium. He made the younger Cato his model, of whose life he wrote an account. After incurring the hatred of Nero, he was condemned to death by command of the emperor.

Thrashing, or **Threshing**, the separation of the grain from the straw, or the seed from the haulm. Formerly, the operation was performed by the flail, and the use of this laborious but effective implement appears to be reviving on small-holdings. The first workable T. machine was invented by Andrew Meikle about 1786; the modern machine, besides effectively sorting

out the products of the sheaf, delivers the straw unbroken and ready for trussing. Steam-power is generally employed, but water-power and even horse-gears are occasionally employed, more especially with fixed machines. The grain is passed by hand or self-feeder into the drum mouth and is threshed out by beaters. The straw is passed out after the grain has been shaken away, by means of riddles and air-blast from a fan and rotary screens which grade the corn. Among the modern improvements and accessories are chaff-bagging apparatus, automatic elevator for delivering chaff direct into a building, and trussing machines for tying the straw into bundles as fast as it is delivered.

Thrasimene, *see* TRASIMINE LAKE.

Thrasylbulus, a celebrated Athenian, son of Lycus. On the establishment of the Thirty Tyrants at Athens he was banished, but with the assistance of the Thebans he overthrew the Ten, who had succeeded to the gov., and eventually obtained possession of Athens, and restored the democracy, 403 B.C. In 390 he commanded the Athenian fleet in the Ægean, and was slain by the inhabitants of Aspendus.

Thread, a fine cord made by twisting the fibres of such substances as cotton, wool, silk, and flax. The slightly twisted yarns used for weaving are strictly called threads, but the term is more commonly applied to the stronger and more highly finished cords used for sewing, etc. The cotton or other material is first twisted into yarn, which is doubled upon itself and twisted in the opposite direction to the original twist. The product is then two-ply thread. To make a stronger thread, *e.g.*, six-cord thread, a number of two-ply yarns are twisted by the winding machine again in the opposite direction to the previous twist.

Thread Cells, Stinging Cells, or Cnidoblasts, occur in Coelenterates as bulb-shaped structures containing fluid and having the narrower end prolonged into a fine tube folded inwards in the cavity of the bulb as a spiral coil. Externally the cell bears a conical projection (cnidocil), and when a small animal comes in contact with this the fine tube turns inside out and is shot into the animal's body, becoming fixed by barbs at the base of the tube while poison passes through it.

Threadneedle Street is a busy thoroughfare, running from Bishopsgate Street to the Bank of England in the City of London. It received its name from the Merchant Taylors' Company. The Bank of England is

sometimes called familiarly 'The Old Lady of Threadneedle Street.'

Thread-worms, *see* NEMATODES.

Threats. It is a felony either (a) *verbally* to accuse or threaten to accuse another of any infamous crime (*e.g.* murder, rape), with a view to extort from the person so accused or threatened or from any other person any property, money, or valuable security; or (b) *to send a letter* containing T. to accuse another person of crime with intent to extort something of value; and so gravely does the law regard this offence that a conviction may involve a sentence of penal servitude for life. The guilt or innocence of the recipient is material only in considering whether the intention of the prisoner was to extort money by his T., or merely to compound a felony (*see* under COMPOUNDING). Similarly it is a felony punishable with penal servitude for any term up to life to send a letter demanding with T. and *without reasonable cause* any money or other property. Sending a letter containing T. to murder a person, or to burn or destroy his house, or to maim his cattle, are all felonies punishable with ten years' penal servitude.

Three-Colour Process, *see* PROCESS WORK.

Three Kings, Feast of, *see* TWELFTH DAY.

Three Rivers, or Trois Rivières: (1) The cap. of St. Maurice co., in Quebec, Canada, and lies at the confluence of the St. Lawrence and St. Maurice. Lumber, cereals, and cattle are shipped from its harbour, and furniture, wood pulp, paper, and boots and shoes are manufactured. The city is also the see of a Rom. Catholic bishop. Pop. (1926) 22,367. (2) A tn. with mineral springs and light car factories, on the St. Joseph R., in Michigan, U.S.A. Pop. (1930) 6863.

Thresher, *see* FOX-SHARE.

Threshing, *see* THRASHING.

Thring, Edward (1821-87), an Eng. educationist, was headmaster of Uppingham School from 1853 till his death. A most earnest, enlightened, and successful teacher, he built up an enduring reputation for his school. His *Theory and Practice of Teaching* appeared in 1833.

Throat, the front of the neck; or the upper part of the respiratory passages in the neck. *See* PHARYNX, LARYNX, QUINSY, SORE THROAT, etc.

Throckmorton (or Throgmorton), Sir Nicholas (1515-71), an Eng. politician and diplomatist, fought at the Battle of Pinkie (1547), and was imprisoned for complicity in Wyatt's rebellion (1554). While on a mission to France he was again imprisoned, for siding with the Huguenots. After

many missions (1561-67) to Scotland for Elizabeth, he was sent to the Tower (1569) for plotting with Norfolk on behalf of Mary Queen of Scots.

Thrombosis and Embolism. T. is the formation of a plug by the coagulation of blood or by depositions from it, and results from injury to the endothelial cells lining the walls of the vascular system. The clots are deposited on the injured wall, and serve as nuclei for further deposits. They obstruct the circulation, and may even completely close the lumen of the blood-vessel. Since blood flows more slowly through veins, venous T. is more common than arterial T. The extent of the injury caused by T. depends on the size, situation, and condition of the thrombus. In a main vessel, the blockage may be fatal; in smaller vessels it usually results in the necrosis of the surrounding tissues. Septic thrombi cause local abscesses, and may give rise to empyema. Frequently by the movement of the blood or by disturbing body movements the thrombus, or pieces of it, become detached, forming emboli, and the carriage of these in the bloodstream is termed *embolism*. E. may also be due to the occlusion of air, usually resulting from the exposure of a wound. Emboli of fat may be formed by the escape of fat from bone marrow when bone is badly fractured. Emboli may block the circulation at a point far removed from the situation of the thrombus, and when septic, cause abscesses and empyema. An embolus blocking the pulmonary artery will cause sudden death, but in arteries with numerous branches, comparatively little interference with circulation is caused by the obstruction of one branch. Obstruction of vessels at some distance from the heart may result in gangrene (*q.v.*).

Thronthjem, see TRONDHEIM.

Thrush, a species of inflammation of the mouth due to a particular fungus known as *Oidium albicans* or *Saccharomyces albicans*, and characterised by diffuse white patches. It generally occurs in feeble children, but adults, prostrated by wasting diseases, may also be affected by it. It is also a disease which affects the frog of a horse's foot.

Thrushes (*Turdidae*), a family of passerine birds of very extensive distribution and of omnivorous diet. The typical genus *Turdus* includes several British species, such as the blackbird, the ring ousel, redwing, and fieldfare, to which the name T. is not commonly applied. The song T. (*q.v.*), thrushle, or mavis, is one of the best-known British song-birds. The missel T. or holm T. (*T. viscivorus*) is a larger bird with a slightly forked

tail. It sings before and during storms.

Thuanus, see THOU, DE.

Thucydides (b. 471 B.C.), a Gk. historian, the son of Olorus, or Orolus, and Hegesipyle, was a native of Attica. The fixing of the date of his birth depends upon the statement of Pamphila that he was forty years old at the commencement of the Peloponnesian War. Apart from this, our principal information respecting him is a biography written by Marcellinus, which is, however, full of contradictions and doubtful stories. Incidentally T. also mentions a few facts about his own life. He is said to have been instructed in oratory by Antiphon, and in philosophy by Anaxagoras. He possessed gold mines in that part of Thrace which is opposite to the island of Thasos, and here he was a person of the greatest influence. He commanded an Athenian squadron of seven ships at Thasos (424), but failing in his attempt to save Amphipolis, he became an exile, probably to avoid a worse punishment. He spent twenty years in exile (v. 26), returning in 404 B.C., when a general amnesty was granted on the restoration of the democracy by Thrasybulus. Where he passed the time of his exile is not mentioned by himself. Marcellinus says that he went first to Ægina, and afterwards to Scapte-Hyle in his Thracian property. According to some accounts, he was assassinated at Athens soon after his return; according to others, he d. at Thasos, and his bones were carried to Athens. At all events, his death cannot be placed later than 401. The Peloponnesian War forms the subject of the history of T. Though he was engaged in collecting materials during the whole of the war, he does not appear to have reduced them into the form of a history until after his return from exile, since he alludes in many parts of it to the conclusion of the war (i. 13; v. 26). He did not, however, live to complete it: the eighth book ends abruptly in the middle of the year 411 B.C., seven years before the termination of the war. The object of the history of T. was to give such a faithful representation of the past as would serve as a guide for the future (i. 22). His observation of human character was profound, and his painstaking accuracy and careful attention to chronology are remarkable. His strict impartiality is another feature of his work. His style is marked by great strength and energy, but he is often obscure, particularly in the speeches, which Cicero found as difficult as we do. See Bury's

Ancient Greek Historians, and Jobb's essay on the speeches of T. in *Hel-lenica*. The Oxford text of T. is edited by H. Stuart Jones (1898-1900). Jowett's translation of *The Pelopon-nesian War* with analysis and notes appeared in 1881. A trans. by C. F. Smith is in the Loeb Library, and Richard Crawley's trans. (1876) is reprinted in Everyman's Library.

Thucydides, an Athenian statesman who led the aristocratic party in opposition to Pericles. He was ostracised in 444 B.C.

Thugs, roving bands of fanatical murderers and robbers who, prior to their suppression in 1830 by Lord William Bentinck, used to infest various parts of Central and Northern India. Thuggery, as their system was called, had a religious basis, the murdered persons and a certain part of their belongings being regarded by the T. as sacrifices to the goddess Kali.

Thuja, see ARBOR VITAE.

Thule, the name generally given by the ancients to the most northerly part of Europe known to them. According to Pliny, it was an island in the northern ocean, discovered by the navigator Pytheas, who reached it after six days' sail from the Orcades. The name T. appears to be merely a classic form of the Gothic *Tiel* or *Tiule*, 'remotest land.'

Thulium, a metallic chemical element, symbol Tm, atomic weight 169.4, atomic number 69, belonging to the rare-earth group (*q.v.*). It was discovered in 1879 by Cleve, but was first prepared pure by James in 1911. Its salts are pale green in colour. T. is extracted from the minerals gadolinite, euxenite, etc.

Thun: (1) A lake of canton Bern, Switzerland, traversed by R. Aar, and also receiving the Simme. Length 10½ m.; average width, 2 m.; greatest depth, 700 ft.; altitude, 1840 ft. (2) A tn. of canton Bern, on R. Aar, 1 m. below its exit from above lake. A trade centre, and has slate and brick works. Pop. (1930) 16,428.

Thunder, see LIGHTNING.

Thunderstorms. Different layers of the atmosphere are at different temperatures; normally what is known as convective equilibrium (see METEOROLOGY) is obtained by the convection currents that are set up when air, warmer than the surrounding layers, rises and expands adiabatically until its temperature falls to that of its surroundings. Violent convection currents, however, upset the stability of this equilibrium, and a T. results. There are three ways in which these currents may be produced: (i) on a clear, hot day when the surface of the earth is heated strongly, so that the layers of air in contact with it are

greatly heated; (ii) when a cold layer of air blows in below the normal level for its temperature; (iii) when a current of cold air undercuts a layer of warmer air and forces it to ascend. The sequence of events is then as follows: Violent currents of warm air ascend and condensation of the water vapour they contain takes place at the colder levels, and a cloud is formed. As the cloud moves forwards it grows by fresh additions from the upward currents in front of it. The small raindrops that first form are carried bodily upwards by the air current; they increase in size by progressive condensation, they fall and are broken up, when they ascend again, and so on. The large drops formed on the edge of the storm, however, fall to the ground and herald the approach of the storm. The hail that frequently accompanies T. is formed when the smaller drops are carried to great heights where they receive a coat of snow, and descend to get a fresh coat of water that freezes on the next journey upwards. Simpson's theory of the lightning that accompanies the storm attributes the origin of the formation of enormous charges of electricity to the breaking up of the raindrops. When a raindrop breaks up the air in its vicinity becomes negatively charged, while the raindrop receives an equal positive charge. The negatively charged air rises more quickly than the drops, and in this way the charges are separated. The formation and break-up of the drops continues until at last the potential difference between the negatively charged layers and the positively charged drops attains the order of a million volts, when the insulation of the air breaks down and the discharge called lightning takes place. Thunder accompanies this discharge, and the rolling of the thunder is due to the echoing of the sound by the banks of cloud. See *Bibliography* at the end of the article on METEOROLOGY.

Thuret, Gustave Adolphe (1817-75), a Fr. botanist, b. in Paris. He published researches on the fecundation of the *Fucaceae* in 1853 and 1855, and in 1867 solved with Bornet the question of sexual reproduction in *Floridæ*. He established a botanic garden at Antibes on the Mediterranean. The *Études Phytologiques*, 1878, and the *Notes Algologiques*, 1876-80, are his chief works.

Thurgau, or Thurgovia, a canton of N.E. Switzerland, having Lake Constance and the Rhine to the N. and N.E. Area 386 sq. m. It is watered by the Thur, Sitter, and Murg. Embroidery, spinning, and weaving are the chief industries. Pop. (1930) 135,706.

Thurifer (Lat. *thus*, incense, *fero*, I bear), that attendant or acolyte who bears the incense at services.

Thurii, more rarely **Thurium** (*Terra Nuova*), a Gk. city in Lucania, founded 413 B.C., near the site of the ancient Sybaris. It was built by the remains of the population of Sybaris, assisted by colonists from all parts of Greece. Among these colonists were the historian Herodotus and the orator Lysias. The new city rapidly became one of the most important Gk. towns in the S. of Italy.

Thuringia, a name applied to a region of Central Germany, including the minor states of Saxe-Weimar, Saxe-Coburg-Gotha, Saxe-Meiningen, Saxe-Altenburg, Schwarzburg-Rudolstadt, Schwarzburg-Sonderhausen, and two Reuss principalities. In April 1919 the two Reuss principalities merged into the one People's State of Reuss, and the Coburg state elected to merge with Bavaria. In the same year the seven Thuringian states combined into one, but in 1922 they divided into ten town and fifteen country districts and one sub-district. The tn. dists. are: Gera, Jena, Weimar, Gotha, Eisenach, Altenburg, Greiz, Apolda, Arnstadt, and Zella-Mehlis; the country dists., Stadtroda, Weimar, Eisenach, Meiningen, Hildburghausen, Sonneberg, Schleiz, Greiz, Altenburg, Gera, Saalfeld, Rudolstadt, Arnstadt, Gotha, Sonderhausen, and the sub-dist. of Camburg. The total area is 4669 sq. m. and the pop. about 1½ millions. The Thuringian Forest is a mountain range extending N.W. from the Frankenwald for 50 m. to the Werra, culminating in the Beerberg (3225 ft.), and the Schneekopf (3205 ft.).

Thurles, a par. and market tn. of Tipperary, Irish Free State, on the Suir. There are turf bogs and coal mines near by. Pop. (1926) 4796.

Thurloe, John (1616-68), an Eng. politician, was appointed secretary to the Council of State in 1652. He sat in parliament (1654-56), and in Cromwell's second council (1657), and was appointed governor of the Charterhouse (1657), and chancellor of Glasgow University (1658). He opposed the Restoration, but was acquitted on a charge of high treason.

Thurlow, Edward, first Baron (1732-1806), Lord Chancellor, distinguished himself at an early age at the Bar, and took silk in 1762. Three years later he entered parliament, and in 1770 was Solicitor-General, and a year later Attorney-General. In 1778 he became Lord Chancellor, and was raised to the peerage.

Thurman, Allen Granbery (1813-95), an American jurist and politician, b. in Virginia. He was called to

the Bar in 1837 at Ohio, and by 1854 had risen to be chief justice. In 1869 he was elected to the U.S. Senate, where he became the recognised Democratic leader, and was mainly responsible for the Thurman Bill, which became law in 1873. He was Democratic candidate for Vice-President in 1888, but was defeated.

Thurn and Taxis, Princes of, a succession of princes who ruled over an immense stretch of ground in Central Europe. The most famous of them, Count Matthias, commanded the Bohemian forces at the time of the dispute over the Bohemian succession and later served Denmark and Sweden, being finally imprisoned and released by Wallenstein. The Princes of Thurn and Taxis claimed an hereditary right over the administration of postal affairs in Central Europe, they having established posts as early as 1460. The last vestige of these rights disappeared in 1868 with their purchase by the N. Ger. Federation.

Thursday, the fifth day of the week. It is named after Thor, the Scandinavian God of Thunder. In the Roman calendar the fifth day was Jupiter's Day, *dies Jovis*.

Thursday Island, lies off the N. point of York Peninsula, Queensland. One of the smallest of the Prince of Wales Is. The chief occupation of its inhabitants is pearl fishing. Pop. 1600.

Thurso, a seaport and market tn. of Caithness, Scotland, on Thurso Bay. It was formerly a trading centre with Scandinavia, and now exports Caithness flagstones. Pop. (1931) 4095.

Thurstan (d. 1140), Archbishop of York, b. at Bayeux, elected Archbishop of York (1114), but refused to acknowledge the supremacy of the Archbishop of Canterbury or to accept consecration from him, and was finally consecrated by Pope Calixtus II. at Rheims (1119).

Thyatira, see ARHISSAR.

Thyme, or *Thymus*, a genus of small prostrate aromatic plants (order Labrateæ), with rose-coloured, white, or heliotrope flowers. The two British species are *T. clamaedrys* and the mountain *T. (T. serpyllum)*, of which the lemon-scented *T.* of gardens is a variety. The *T.* used for seasoning and flavouring is *T. vulgaris*, a native of Southern Europe.

Thymus Gland, a temporary organ lodged partly in the anterior superior mediastinum, partly in the neck. It attains its full development at about the end of the second year of life, after which it gradually atrophies, and at puberty has almost entirely disappeared. See further under DUCTLESS GLANDS.

Thyroid Gland (*θυρεός*, shield; *εἶδος*, form), one of the so-called ductless

glands, consisting of two lateral lobes, conical in shape, connected at about their lower thirds by an isthmus which passes transversely across the trachea. A third lobe called the pyramid sometimes arises from the upper part of the isthmus or from one of the lobes, generally on the left side, and ascends to the level of the hyoid bone. Occasionally this lobe is found to be detached. Structurally, it consists of follicles lined with epithelium, producing a peculiar yellowish, glue-like substance known as colloid. Its function is uncertain, but it is thought to be the production of some internal secretion which counteracts poisonous productions of the system. Enlargement of the gland, which may be due to hypertrophy of any of its constituent parts, is called goitre, and is occasionally associated with a disease known as exophthalmic goitre. Cretinism or myxedema results when the gland is absent. Preparations of the T. G. of animals are used medicinally.

Thyrus (Gk. *θύρος*), the wand carried by Dionysus and the Bacchantes when taking part in his orgiastic rites.

Thysanura, or **Bristle Tails**, an order of wingless insects, with long, many-jointed feelers and small paired limbs on several of the abdominal segments. They occur under stones or in damp earth, and often in human dwellings, one especially favouring bakers' ovens. One of the best known is the 'silver fish' (*Lepisma saccharina*) often found among papers in drawers and cupboards.

Tian-Shan (*Thian-Shan*, celestial mountains), a mountain system of Central Asia, forming part of the boundary between Russian and Chinese Turkestan and extending N.E. from the Pamir to the western fringe of the Gobi desert. The main range, including the ranges of Peter the Great, Trans-Alai, Kokshal-tau, and Sary-yassy, forms the border ridge of the High Plateau of E. Asia, to which they slope on the S.E. In this chain, with a general elevation of 15,000 to 20,000 ft., are the chief peaks, Kaufmann Peak (22,500 ft.) and Khan-Tengri (24,000 ft.), and the largest glaciers, and it is crossed by passes at an elevation of 10,000 to 14,000 ft. On the N.W. slope are a series of shorter fringing chains, running parallel to the main ridge. Among these are the Baisun-tau, Hissar, and Alai ranges; Bish-ilik, Choktal, Talas, Ala-tau, and Alexandrovsky Range; the Trans-Ili, Kunghei, and Terskei Ala-taus, the Dzungarian Ala-tau, the Nura-tau, Kara-tau, Chu-ili Mts., Uoh-Kara, and the Chingiz-tau. In this region are the depressions of Kokan or Fergana, Issyk-kul, Kulja, and Ebi-nor,

and the gorges of the rivs. Naryn, Ili, Zerafshan, and Tarim. The general elevation of these minor chains is 10,000 to 19,000 ft. Forest rises to about 9500 ft.

Tiara, the papal triple crown, symbol of sovereign power, not sacred like the mitre. It is a high cap of gold cloth, encircled by three coronets and surmounted by a gold cross.

Tiber (Lat. *Tiberis*, It. *Tevere*), the chief riv. in Central Italy, on which stands the city of Rome. It rises in two streams issuing from the Apennines near Tifernum, on the eastern frontier of Tuscany, and flows S.W., dividing Etruria from Umbria. After flowing 110 m., it receives the Nera, and from its union with this riv. is navigable. Three m. above Rome it receives the Teverone, and within the walls of the city it is about 300 ft. wide and from 12 ft. to 18 ft. deep. The T. empties into the sea by two arms, enclosing a dismal morass, once known as the Sacred Isle or Isle of Venus. Length 245 m.

Tiberias. A tn. in Palestine. The anct. city lay on the W. shore of the Sea of Galilee. Herod Antipas founded a new city c. A.D. 26, and called it T. in honour of the Emperor Tiberius, his benefactor. It later became the cap. of Galilee, a position held previously by Seppholis. It continued to be the seat of gov. under Agrippa I. and under the Rom. procurators. After the destruction of Jerusalem (A.D. 70) it became a resort of the Jews. T. was the seat of a bishop under Constantine. It was taken by the Arabs in 637. Later, it was taken by Tancred, who erected a church in the city, but lost by the Crusaders in 1187. The modern tn., Tabariyeh, stands at the N.E. corner of the plain, some of the front walls actually rising out of the water. T., like other tns. in Syria and Trans-Jordan, is built of black basalt, which gives it a sombre aspect. It is partly surrounded by walls and bastions, restored by Omar al-Daher. In recent years a new residential quarter has grown up outside the walls on the slopes to the N.W. of the old tn. To the S. of the tn. are the hot baths, famous for their curative properties in the Rom. occupation. The springs were known to the Roms. as Ammaus, and extolled by Pliny. Herod Antipas built baths around the springs and placed his acropolis on the slope above. At present the main source of the springs is covered with a low dome, whence the hot water passes to the baths. The present baths were built by Ibrahim Pasha in 1833, during the Egyptian occupation, and additions were made in 1890 by the Turks. The

therapeutic properties of the baths for rheumatism and skin diseases have long been recognised. The saline constituents of the water are chiefly sodium and calcium chloride and magnesium bromide, and the water is slightly radioactive. Below the baths is the tomb of the famous Talmudist Rabbi Meir, and to the N. of the tn. those of Maimonides and Rabbi Ben Akiba. At the N. end of Lake T. is Capernaum (Tel Hum), the synagogue of which has been excavated and re-erected.

Tiberius Claudius Nero (42 B.C.-A.D. 37), Rom. Emperor, the stepson of Augustus. Hewas the son of T. Claudius Nero and Livia, afterwards the wife of Augustus. He was carefully educated and became well acquainted with Gk. and Latin literature. At the age of twenty-two he was sent

he proceeded to make himself absolute. Tacitus admits that from A.D. 14 to 23 Tiberius governed with justice and moderation (*Annals*, Bks. I.-III.). Tacitus ascribes the departure of Tiberius from Rome to a desire to give full vent to his sensual inclinations in private. Tiberius had long hated Rome, and in A.D. 26 he left it, never to return. He first went to Campania on the pretext of dedicating temples there, but in the next year he moved to Capræ, an island off the Campanian coast. Meanwhile his minister Sejanus, in whose hands the real gov. of the state had long rested, was plotting to obtain for himself the imperial power. In A.D. 31 he was put to an ignominious death, to which many of his friends followed him. On March 16 Tiberius d. at the villa



TIBERIUS ON THE SEA OF GALILEE

by Augustus to restore Tigranes to the throne of Armenia. In 13 B.C. he was consul with P. Quintilius Varus. Three years before this he had been given the charge of the northern wars, together with Drusus, and during the years from 12 to 9 B.C. he had conquered Pannonia. He remained in Germany until 6 B.C., in which year he obtained the *tribunitia potestas* for five years, and retired with the emperor's permission to Rhodes. He returned to Rome at the end of seven years, and in A.D. 4 he was adopted by Augustus. In the same year he took command of the Rom. armies in Northern Germany, and here he remained during the next seven years. On the death of Augustus, Tiberius hurried home, and the skilful management of Livia secured the throne to him without opposition. Tiberius was suspicious in character, and he began his reign by putting to death Postumus Agrippa, the surviving grandson of Augustus. Then

of Lucullus at Misenum, having been smothered by the order of Macro, the prefect of the Prætorians. The character of Tiberius has been one of the most disputed points in history. Tacitus and Suetonius unite in painting it in the blackest colours. He is defended by Dean Merivale in *History of the Romans under the Empire*, and by Professor Beesley in *Caligula, Claudius, and Tiberius* (1878).

Tibesti, a mountainous dist. of the Sahara, in the region inhabited by the Tibbus. The camels are valued in E. Sahara, and the dist. also produces donkeys, goats, and sheep.

Tibet or Thibet, Tübet or Bod-pa, a country in Central Asia, nominally a dependency of China. It is bounded by the Kwenlun Mts. on the N., separating it from Eastern Turkestan, by China on the E., by the Himalayas on the S., separating it from British India, Bhutan, Nepal, etc., and by Kashmir on the W. The surface is a table-land, the average height of

which is 16,000 ft. above sea-level, the highest plateau in the world. The northern half of T. is almost devoid of vegetation owing to the severity of the climate; there are numerous mountain ranges, and in the valleys are numbers of lakes, many of them salt, and also hot springs. To the S. of the Tängla Mts. the climate is less severe; it is therefore the most populous part of T. Here also lie the upper courses of the great rivs., the Brahmaputra, the Indus, Sutlej, Ganges, Mekong, Salwin, Kwang-ho, and Yangtze-kiang. To the N. of the Brahmaputra lie great mountain ranges with peaks almost equalling in height the Himalayan Mts. to the S. Of these the most important are the Nienchen-tang-la and the Hlunpo-Gangri ranges. Gold is found in T., and according to some explorers there are rich deposits in northern and eastern T. which have been scarcely touched. Mining is carried on in only a few places, and though some gold is exported to China it amounts to little. Iron pyrites are found and lapis-lazuli and mercury in small quantities, also salt and borax among the lakes. The climate varies considerably, though for the most part cold and dry. It is influenced by the S.W. monsoon and high winds are frequent. In certain dists. the rainfall is very high and in parts extremes of cold and heat are felt. Sheep and cattle are reared, also goats, pigs, and poultry; and horses, mules, and donkeys are used. There are innumerable species of wild animals, including the yak, leopard, deer, antelope, bear, wolf, etc., and rare kinds of pheasants and partridges are also found. Trade is carried on principally with China, Turkestan, Mongolia, India, and Indo-China. The chief imports are silk, carpets, gold lace, tea, porcelain, leather, cotton goods, horses, and sheep, and the chief exports are wool and woollen goods, salt, rugs, furs, drugs, borax, and some gold and silver. The people of T. are of Mongoloid origin, as far as is known, and they speak Tibetan, which is allied to Burmese, and comprises a number of dialects. The religion of the country is Lamaism (*q.v.*). Polyandry is a custom of the people, all the brothers in a family having the same wife, but this custom is not widespread. The country is divided into five provinces, Amdo, Kham, Wu (which includes Lhasa), Tsang, and Nari. Once dependent on China, the real rulers of T. are the Lamas, whose authority is vested in the Dalai Lama at Lhasa. At Lhasa there is a national assembly, or Tsong-du, which settles all the important affairs of state, and is re-

sponsible for the foreign policy of the country. From very early days T. was the object of explorers, but owing to its position their journeys were fraught with difficulty, and up to the time of the British expedition of 1904 no European had succeeded in penetrating to Lhasa. Communications are slowly being opened up, and T. and India are now linked by a telephöne. A line also exists between Lhasa and Gyangtze. The area of T. is about 463,200 sq. m. Pop. about 2,000,000.

Of the early history of T. little is known. In 639 Strong tsan gam-po founded Lha-Idan, which later became Lhasa, and also introduced Buddhism into the country. From the fifth to the tenth century A.D. T. was a monarchy, which eventually disintegrated owing to opposition among the nobles to the increase of temporal power among the priesthood. This period of disunion lasted from the tenth to the thirteenth century. The greatest figure of this time was Atisha, the Indian Buddhist, who came to T. in 1026. In 1253 all the eastern part of the country was conquered by Kublai Khan, and it was he who first placed the gov. in the hands of the lamas. The first priest-king was the abbot of the Sakya monastery, but in the seventeenth century the Sakya line was overthrown by Nga-Wang Lob-sang, abbot of the Drepung lamasery, and he inaugurated the present line of rulers, the Dalai Lamas. It was not until 1720 that the country was finally brought under Chinese rule. India had always been anxious to open up trade with T., and between 1872 and 1886 three different missions were organised, but were given up. In 1888 the Chinese invaded Sikkim and a military expedition was sent to drive them out, which resulted in a treaty (1890-93). The lamas not having been consulted in the matter, they took offence, and revenged themselves by trying to bring about a treaty with Russia. Further inroads were made into Sikkim, and Lord Curzon, then Viceroy of India, came to the conclusion that strong measures were necessary. Colonel F. E. Younghusband was sent with an escort to see if he could come to terms, but he was unable to do anything. It was then decided to send an armed expedition, and in Dec. 1903 Colonel (afterwards Sir) F. E. Younghusband, with General Ronald Macdonald in command of the troops, set out, and after some severe fighting they reached Lhasa on Aug. 3, 1904, and the Dalai Lama fled. Peace was concluded in Sept. by a treaty which provided against further incursions into Sikkim and

established British trade marts, and also prevented any foreign power receiving concessions in the country; the Tibetans also had to pay an indemnity. China signed an agreement to this in April 1906. A treaty with Russia was concluded in the following year, in which it was agreed that no concessions should be sought by either power, and no expeditions dispatched without the consent of both countries, for a term of three years. In 1908 the Dalai Lama was reinstated in Lhasa by Chinese authority, but an insurrection taking place, Chinese troops were sent to quell it and came into collision with the Dalai Lama. This resulted in his being deposed by China, whereupon he fled to India hoping to obtain help from the British (1910). When later a revolution broke out in China, the Tibetans took the opportunity to rise against the Chinese, and in Aug. 1912 a treaty was signed which agreed that the Chinese should leave the country and return to China by way of India. The Dalai Lama then returned. In July 1912 the Chinese Gov. sent out another expedition with the object of reconquering T., but in consequence of a memorandum sent to China by the British Gov., drawing attention to the Anglo-Chinese treaty of 1906, it was withdrawn. A conference was held at Simla, 1913-14, between England, China, and T., but the convention which was then drawn up assuring autonomy to T. was not ratified by China. In 1917 a Chinese General, Peng Jih-Sheng, took advantage of a frontier incident to make war on T., but was decisively defeated. Since then T. has thrown off China's yoke, and, maintaining friendly relations with the British Gov. of India, preserves her independence.

Literature.—Tibetan literature began with the introduction of Buddhism and the translation of the Indian classics. A second period began in the fifteenth century, mainly under Chinese influence, but Tibetan literature has never lost its religious character. Two of the most sacred books are the *Kangyur*, or the Canon of the Buddhist Law, translated from the Sanskrit, and the *Tengyur*, a commentary upon the Canon in 225 volumes. It is not known when printing or xylography was introduced into T. The text is printed from wood blocks on large sheets of paper, which are not bound, but placed between boards and wrapped in silk. A Tibetan book may weigh some thirty pounds. Apart from the sacred writings, T. is rich in folk-lore, short stories, and fables handed down orally from generation to generation. The love of theatrical

performances among the Tibetans has produced a stock of religious, historical, and fairy plays.

Art.—Tibetan painting is a sombre reflection of Lamaism, the earliest portrait being that of the goddess Tara, dating probably from the tenth century. The demonic subjects of Tibetan paintings are generally luridly depicted, while later Lamaistic paintings of a lighter character lose even this distinction, and have been pronounced as merely 'provincial Chinese art.' Tibetan architecture from an early time assumed an imposing style. Whence it originated is not known. It is distinguished for its solidity and massive design. Of old buildings still standing, the Jo Khang, the Lhasa Cathedral, and the huge monastery of Samye may be mentioned. In the applied arts great skill and beauty were attained in the production of metal-ware, jewellery, and decorated swords. Most household utensils are of metal, chiefly copper, or wood, and the best worked metal-ware comes from the Derge dist. of Kham.

Consult Sven Hedin, *Central Asia and Tibet*, 1903, *Trans-Himalaya*, 1909-13; Sir F. E. Younghusband, *India and Tibet*, 1910; Rin-Shen King, *We Tibetans*, 1926; P. Sherap, *A Tibetan on Tibet*, 1926; C. A. Bell, *The People of Tibet*, 1928; D. Macdonald, *Land of the Lama*, 1929; S. N. Wolfenden, *Outlines of Tibeto-Burman Linguistic Morphology*, 1929.

Tibullus, Albius (c. 54-c. 18 B.C.), a Rom. poet, was descended from an equestrian family, whose estate was at Pedum, between Tibur and Præneste. In the year 28 B.C. he followed his patron, Messala, into Aquitania and thence into the East, but was taken ill at Corcyra and had to return. His poetry, addressed to two mistresses under the names of Delia and Nemesis, has little ardour, but is marked by its air of gentle tenderness and self-abnegation; on the other hand his bucolic elegies are some of the sweetest and best in the Latin language. Horace was warmly attached to him. The text of the poems has been edited by J. P. Postgate in Oxford Classical Texts, 1905, and with a trans. by him in the Loeb Library. Cranston's trans. appeared in 1872.

Tibur, see TIVOLI.

Tic Douloureux, see NEURALGIA.

Tichborne Case, one of the most celebrated trials in the annals of the Eng. criminal law. The prisoner, Thomas Castro, otherwise 'Bullocky Orton,' the big butcher of Wapping, was tried and convicted for perjury in putting forward in the civil courts

a bogus claim to the Tichborne title and estates (1872). Not only did Orton in posing as Sir Roger Tichborne, son of Sir J. F. Doughty Tichborne (*d.* 1862), answer with astonishing skill every question put to him in the civil actions, but even the real Tichborne's mother at first 'identified' him as her missing son. The whole proceedings cost the Tichborne family some £70,000 in legal expenses. In 1874 Castro was sentenced on two counts to two *cumulative* terms of seven years' penal servitude each.

Ticino, or **Tessin**: (1) A canton of Switzerland, lying on the Italian slopes of the Alps. Area 1088 sq. m. In the S. it merges into the Lombard plain. It is watered by the Ticino and its tributaries. Cereals, tobacco, fruit, chestnuts, vines, and silk are cultivated. It was taken by the Swiss from Italy in 1512 and joined the League in 1803. Pop. 162,000. (2) A riv. of Switzerland and Italy, which rises in the above canton near Nufenen Pass, flows through Lake Maggiore and between Piedmont and Lombardy, and joins the Po $3\frac{1}{2}$ m. S.E. of Pavia. Length 150 m.

Tickell, Thomas (1686-1740), an Eng. poet, was appointed professor of poetry at Oxford University in 1711. He wrote much minor verse, some of which appeared in the *Spectator*, and his translation of the *Iliad* appeared simultaneously (1715) with that of Pope, a proceeding which resulted in the historic quarrel between Pope and T.'s friend, Addison. His best work is *Kennington Gardens* (1722). When Addison became Secretary of State he made T. an under-secretary.

Ticker or Tape Machine, a telegraphic receiving instrument that automatically prints off stock quotations (a stock ticker) and other news on a paper ribbon, or tape. In London, the Exchange Telegraph Company collects a continuous record of prices of stocks and shares daily and circulates this record to its subscribers by tape machine. The prices as telegraphed are recorded in the subscriber's office on paper tape, whence the instrument receives its name of tape-machine. The similar instrument in America, which was improved by Edison, is called a 'ticker' (this name being properly of American origin), from the sound made by the machine as it prints and winds out the tape. The machine is also used for circulating all manner of news from news agency offices to the newspaper offices. Operators in the exchange centre receive the prices or other intelligence by morse code, and then, by means of a keyboard

worked after the manner of a typewriter, record the message on to the moving tape which in its turn passes the message through a transmitter operating a number of line relays.

Ticket-of-Leave, *see* PRISONS.

Ticks, or **Ixodidae**, a family of Acarina, with flat bodies protected by horny shields. During part of their existence they are blood-sucking parasites on animals and birds, for which they have developed a rostrum or beak composed of two barbed harpoons above and below a dart. Eggs are laid on rough herbage and hatch into white six-legged larvæ, which climb up the legs of passing animals and in some species complete their life history on the coat, but in others return to the grass for a period. T. cause irritation and anæmia, but their chief danger to their hosts is in the introduction of parasitic protozoa, causing such diseases as Texas fever and redwater.

Ticonderoga, a vil. of New York, U.S.A., in Essex co., situated N.W. of Lake George, with manufactures of paper and wood-pulp. Graphite is found near by. During the Fr. War T. was unsuccessfully attacked by General Abercrombie, and General Howe was killed here, 1758. It was taken, however, by Amherst, 1759. In the War of Independence it was taken by Americans under Ethan Allen (*q.v.*), 1775; retaken by Gen. Burgoyne, on whose surrender it was abandoned; reoccupied by British, 1780. Pop. (1930) 3680.

Tiunas, Indians found in Brazil and Peru around the confluence of the Javary and Marañon.

Tides are regular disturbances of the fluids on the earth, produced by the action of the gravitational forces of the moon and sun. The earth, having a diameter of about 8000 m., is subject to a stress due to the different degrees of gravitational pull; this stress and its variations have not been determined empirically. Some evidence, but only extremely slight, of tidal action in the atmosphere is barometrically shown. The oceanic waters are markedly disturbed, and the predominating influence of the moon is shown by the usual interval of 24 hr. 51 min. between similar phases being identical with the average interval between two successive passages of that body across the meridian.

Tide-raising Forces.—The basis of tidal theory may be simply illustrated. The sun and moon are the only bodies concerned to any appreciable degree. Since gravitational attraction of a body varies directly as the mass and inversely as the square of the distance,

that of the moon can be simply determined. The moon's mass is $\frac{1}{81}$ that of the earth, its distance from the earth's centre 60 times the earth's radius; the attraction at C, the earth's centre = $g/85 \times 60^2$; at A, the sublunar point, $g/80 \times 59^2$; at B, the antipodes of the sublunar point, $g/80 \times 61^2$. The difference of attractions at A and C works out at $g/8424000$; at C and B, $g/8835000$. Thus the moon exerts a lifting effect, when overhead or under foot, represented by a loss of one pound

also a lower one than the average; neap tides at the quarters are lower at high, higher at low tide, than the average. The principal tide here being that due to the moon, the sun raises the low at the expense of the high tides. When the moon is in perigee spring tides are higher, and if this occurs about Jan. 1, when the earth is nearest the sun, the highest tides are produced; in each case low tide is correspondingly reduced. The relative heights of spring and neap tides are about 7 : 4.

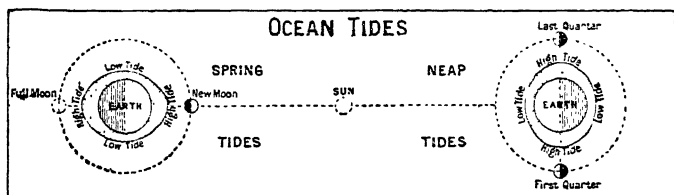


FIG. 1

in a body weighing 4000 tons. As a result the waters of the ocean should 'bulge out,' as shown in the figure. The lifting effect at B is understood if A, C, and B are considered unconnected; they would then fall at different speeds towards the moon and separate more and more; as they are connected, in reality there is a tension which allows a degree of separation. The maximum lifting-force of a distant attracting body varies inversely as the cube of its distance; if d be the distance of the moon, M its mass, r the radius of the earth: attraction at A = $M/(d-r)^2$; at C = M/d^2 . The lifting force at A = $M[1/(d-r)^2 - 1/d^2] = M[2dr - r^2/d^3 - 2d^3r + d^2r^2] = M \times 2r/d^3$, when r is very small compared with d . This is the reason for the sun's smaller effect; the attracting force, varying as the inverse square of its distance, 23,500 r , is nearly 200 times that of the moon; but its tide-raising force, varying as the inverse cube, is only about $\frac{1}{8}$ as much, being $g/19600000$. Fig. 1 shows clearly the combined effects for the statical problem with a uniformly ocean-covered earth and no friction. At new and full moon both bodies are attracting in nearly the same line and give spring tides (left hand); at first and last quarter the attractions are at right angles, and high tide appears under the moon; low, under the sun. These are the neap tides. Spring tides, occurring at new and full moon, give a higher tide than the average and

Rise and Fall.—Since the earth with its waters is rotating, every place as it comes under the influence of external attraction has its waters gradually lifted to a maximum, then gradually dropped to a minimum. The *flowing* or *flood tide* is the former, the *ebb-tide* the latter movement. Alternating high and low tides should

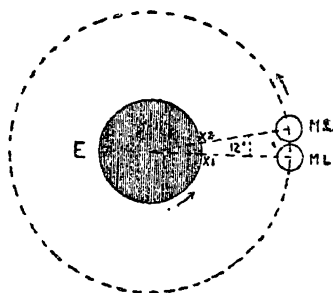


FIG. 2

occur, according to Fig. 2, twice each in twenty-four hours; actually the average period is 24 hr. 51 min., since during the rotation the moon travels forward in its orbit, so that a place carried by the earth's rotation from high tide position completes a full rotation, but has to travel in addition another 12° or $\frac{1}{2}$ hr. before coming again under the moon.

Priming and Lagging.—The tides *prime*, or arrive early, at the time of spring tide, the average interval being about 24 hr. 38 min.; at neap tides the interval averages 25 hr. 6 min., and the tides *lag*. These differences are due to the constriction of solar and lunar tides. At new and full moon, when these tides coincide, the crest would be under the moon; at quadrature the solar wave crest and trough combining symmetrically with the lunar trough and crest respectively, produce merely a difference in height, not a displacement. In other positions displacement will occur owing to the combination of the lunar and solar crests. This gives high tide, if the sun's influence is exerted to the W. of that of the moon, about half an hour ahead for the angle 45° , three days after full or new moon. The half-hour is gained from diminished intervals for the three preceding days. When the solar crest occurs to the E. of the lunar within a quadrant, the combined crest is found further E. and is reached later by a similar interval, giving lag.

Diurnal Inequality.—Twice a month the moon being at its farthest point N. (28°) of the celestial equator, the tidal wave crest is found in the N. hemisphere, its antipodal crest in the S. A sublunar place is carried round by the earth's rotation in a plane inclined at an angle to the diameter forming the crests, so that its record high tide is not at the antipodal crest but to one side of it, the second high tide being thus less than the first; this is known as the diurnal inequality.

The *theory of tides* has been worked out very completely by Sir George Darwin, with very many interesting and important results. For example, Lord Kelvin concluded, from an analytical study of thirty-three years' observation, that the earth as a whole must be more rigid than steel, but perhaps not quite so rigid as glass. The friction due to tides involves a loss of energy obtained from the earth's energy of rotation, and tends to retard it, thus lengthening the day; there are counteracting forces, and in any case no difference has been actually noted; it could be only extremely slight, scarcely as great as one-millionth of a second per year. Such a loss of gravitational speed would tend to accelerate the moon's orbital motion and cause that body to recede, thus lengthening the month. This forms the basis of Sir George Darwin's *tidal evolution* theory, which thus accounts for planets having receded from the parent body after separation.

Actual Tides.—The configuration of land and water, and the varying

depth of the latter, are the chief elements in completely upsetting calculations from theory. High tides occur at all intervals before and after the meridian noon in different places. For any port the mean interval is known as the *establishment of the port*; at New York it is 8 hr. 13 min., with a variation of 22 min. either way during the month; at London Bridge it is 1 hr. 58 min.; at Bristol, 7 hr.; Yarmouth, 9 hr.

Height of Tides.—In the open ocean no accurate determinations have been made, but 2 to 3 ft. is the average height. Shallow seas, by diminishing the velocity, increase the height, which may be exaggerated again by entry into converging channels or estuaries. A hundred feet, it is said, has been recorded in the Bay of Fundy; at Bristol 50 ft. is attained, yet the E. coast of Ireland shows a range of only 2 ft. The effect of shallow water and projecting land, giving rise to reflection and interference, is to set up *tidal currents*, though the true tide gives no displacement of water. Such currents may give rise to *double tides* as at Southampton, the falling tide of the channel driving through Spithead, the rising tide through the Solent, each giving high water. Such currents entering riv. mouths give rise to the *bore, eger, or mascaret*.

Uses.—Physiographically tides aid in the destruction of coast-line and help to carry debris to the sea; they prevent the formation of deltas, yet aid rivs. in building their lower flood plains. Biologically they have immense influence, the sea-shore 'between tides' having its peculiar life. Commercially they are useful in carrying vessels inland, and for the generation of electrical energy.

Absence of Tides.—Though theoretically tides are produced in all bodies of water, they are often inappreciable; thus Lake Michigan has probably a tide of 2 in. Enclosed seas such as the Mediterranean and Baltic have a tide of anything up to 1 or 2 ft.

See Darwin, *Theory of Tides*; Lamb, *Hydrodynamics*.

Tidore, an island belonging to the Moluccas, Malay Archipelago, situated off the W. coast of Halmahera. Cap. Tidore, on the E. coast. In the S. the island is a symmetrical volcanic cone from which vapour occasionally rises. It is fertile, producing cotton, maize, fruits of various kinds, and tobacco and spices. In the early sixteenth century the Portuguese captured the island, but in the next century it became a Dutch colony. For centuries there has been a sultan of T., but his sovereignty to-day is purely nominal. Pop. 32,000.

Tieck, Johann Ludwig (1773-1853), a Ger. writer of novels, criticism, and dramas, *b.* at Berlin, the son of a rope-maker. He was a great admirer of Shakespeare and a romantic writer, who showed his predilection for the bizarre and fantastic in a story in three volumes entitled *William Lovell* (1795). About this time he published his tale of *Peter Lebrecht* (1796), some poems (*Der Blonde Eckert*), and a play *Die Werkerte Welt*.

Tiel, a tn. of the Netherlands, in the prov. of Gelderland, on the Waal, with a considerable trade in grain and wool. Pop. 12,030.

Tiele, Cornelis Petrus (1830-1902), a Dutch theologian and scholar, *b.* at Leyden. He was professor of the history of religions from 1877-1901. His best-known works are *On the Elements of the Science of Religion*, 1897-99; *Outlines of the History of Religion*, 1876.

Tientsin, a treaty port and city of China, cap. of the prov. of Chi-li, at the junction of the Peiho with the Grand Canal, 76 m. S.E. of Pekin. It is the emporium for Northern China, with an extensive trade. The exports consist chiefly of coal, skins, cotton, wools, ground-nuts, beans, peas, and dates. Pop. 800,000.

Tiepolo, Giovanni Battista (Giam-battista), famous Italian painter, son of Domenico de Giovanni T., a ship's captain and merchant. Born in Venice, his fresco painting being mainly associated with that city. His father left a substantial fortune among his nine children, and T. was able to devote his attention to art. His earliest master was Lazzarini, a noted painter in his day, but it was rather the work of Paul Veronese and of Titian that chiefly influenced him. His earliest known pieces are those in the chapel Sta. Teresa in the Church of Scalzi at Venice. These pieces, in conception after the style of Piazzetta, have been criticised for affectation and wanton fantasy, but they have force and brilliance. His more individual taste lay in the direction of transparent atmospheric effects, in which effects he has never been surpassed. T. did a great deal of work on the huge ceilings and walls of the villas and palaces of Venice and in the Veneto and, later, at Würzburg and at Aranjuez and San Sebastian in Spain. In 1737 he also did a number of notable works for the interiors of the Villa S. Sebastiano at Malmara, near Vicenza, the chief being 'Scenes from the Iliad,' 'Orlando Furioso' and 'Gerusalemme Liberata,' in which he was assisted by his son, Giovanni Domenico. His best ceilings and frescoes in Venice are 'The Institution of the Rosary' (1739), 'The

Triumph of Faith' (1760), 'Scenes from the Story of Antony and Cleopatra,' and 'Transport of the Holy House of Loreto,' 1743-44. T. reveals amazing versatility and nearly every picture gallery in Europe has examples of his work. In Spain he incurred the inveterate jealousy of Raphael Mengs, and indeed his powers as a colourist and as a draughtsman were long obscured through the rivalry of Mengs as well as the want of perception of the succeeding generation; and it was not until the late nineteenth century that his work really won universal recognition. Died March 27, 1770. A fairly exhaustive list of his frescoes and other paintings will be found in Bryan's *A Biographical Dictionary of Painters and Engravers*, 1905.

Tierra del Fuego (Land of Fire), a group of islands separated from the southern extremity of S. America by the Strait of Magellan. It consists of several large islands, the principal one being called Tierra del Fuego or King Charles South Land (area 18,500 sq. m.), Navarin, Hoste, Clarence, Santa Inez, besides a number of much smaller size, the most important of which contains Cape Horn at the extreme S. The highest peak is Mt. Sarminto (6900 ft.). It is inhabited by savages of low type, who now number less than 1000. T. was discovered by Magellan in 1520. Half of Tierra del Fuego Island, and the isles W. of it, belong to Chile, the rest forms an Argentine territory (cap. Ushuaia) with an area of 8299 sq. m. and a pop. of 2504. Punta Arenas is cap. of the Chilean portion.

Tiers Etat, *see* STATES-GENERAL.

Tiffin, a city and co. seat of Seneca co., Ohio, U.S.A., on the Sandusky R. It is the seat of Heidelberg University (Reformed Church). Pop. (1930) 16,428.

Tiflis: (1) A former gov. of Transcaucasia, Russia, bounded on the N.E. by the crest of the main Caucasus range. Most of it is now included in the Georgian S.S.R. (*q.v.*), of which it forms a prov. (2) The cap. of the Georgian republic, and of Transcaucasia, stands on R. Kura, 275 m. N.W. of Baku. It is a trading centre, and has numerous manufactures—carpets, goldsmith's work, cotton goods, tobacco—and hot sulphur springs. One of the most anct. tns. in the republic, it is now being modernised. Pop. (1926) 292,973.

Tigellinus, Sophonius, son of a native of Agrigentum, the minister to Nero's worst passions, and of all his favourites the most obnoxious to the Rom. people. On the accession of Otho, T. was compelled to put an

end to his own life. Tacitus, *Annals*.

Tiger (*Felis tigris*), a huge and powerful carnivore, peculiar to Asia, though absent from Ceylon, Afghanistan, Baluchistan, and Tibet. The Indian T. rarely exceeds 10 ft. in length, and the female averages about 8 ft. 6 in. Fine males weigh from 400 to 500 lb. Young animals, which are characterised by their canine teeth being hollow throughout, are handsomer than older ones, the tawny orange colour being richer and the stripes darker and closer together. Ts. are monogamous, though there is no reason to suppose that they pair for life. The period of gestation is fourteen or fifteen weeks, and from two to five cubs are born, though more than two are seldom reared. Ts. will eat carrion, but generally kill for themselves. Their food consists principally of deer, antelopes, and smaller animals, but occasionally powerful ones are attacked, and they sometimes kill the wild boar. Man-eaters are not, as is the case with lions, old and worn out, and many are in splendid coat when killed after a meal on human flesh. The taste is generally acquired during a hunt from which the animal escapes after having mauled a man, but even man-eaters are known to hunt for other food.

Tiger Flower, see **TIGRIDIA**.

Tiger Lily, see **LILY**.

Tiglath-Pileser, the name of several ant. Assyrian kings (see **ASSYRIA**), of whom the third of that name is mentioned in the Bible. He ascended the throne in April 745 B.C. The revolution in the northern kingdom of Israel, which set Pekah on the throne of Samaria, appears to have coincided with a confederacy being formed against Assyria; the refusal of Ahaz to join it was the occasion of the determined assault made on the kingdom of Judah by Pekah and Rezin which led to the appeal to T. by Ahaz. In this campaign T. besieged Damascus, and, apparently masking it, he proceeded to the conquest of Gilead and Galilee, deporting the inhabitants.

Tigranes, or **Dikran**, the name of several kings of ant. Armenia, one of whom flourished as early as 550 B.C., and was a friend of Cyrus the Great, helping to overthrow the Median empire. The best-known bearer of the name (c. 121-55 B.C.) was the son-in-law of Mithridates the Great. He was king of Armenia (c. 96-55 B.C.), and master of the Syrian monarchy from the Euphrates to the sea (83), founding the city of Tigranocerta. T. at first supported Mithridates against the Romans. (76), but

was defeated by Lucullus (69-68) and by Pompey (66).

Tigré, one of the three main divisions of Abyssinia, Africa, formerly a kingdom, a dist. in the N.E., lying above the Takazze's defile. T. is bounded N. by Eritrea, S.W. by Amhara. Adua (cap.) and Ascum are its chief tns. Nominally subject to the king of Shoa since 1889, T. has been partly attached in the N. to the Italian Eritrea. The inhabitants are a Semitic race.

Tigridia, or **Tiger Flower**, a genus of bulbous plants (order Iridaceae), natives of tropical America. They are grown in the cool greenhouse and also in warm borders, where the bulbs must be protected in winter.

Tigris, a riv. of Asiatic Turkey, rising in several branches, the chief being the Schat, Dijle, or Dikla, in the frontier mountains of Armenia and Kurdistan, near Kharput and Bitlis. The chief headwater flows E., passing S. of Lake Gelik, S.E. and S. to Diarbekir, and E. to Til, where it receives the Bohtan Su or Chai, which rises about 20 m. S. of Van and flows W. to this point. The stream then flows S., entering the plains at Jezire, and then S.E. to Kurna, where it unites with the Euphrates to form the Schat-el-Arab. The chief tributaries are the Great and Lesser Zab and the Diala or Shirwan, all coming from the E. On the banks are Mosul, Tekrit, and Bagdad, and the ruins of Nineveh, Seleucia, Ctesiphon, the ancient Mesopotamia lying between it and the Euphrates. Length 1150 m., navigable by steamers to Bagdad.

Victory of the Tigris (1918).—The last Turkish army on the Tigris, numbering 10,000 rifles and fifty-nine guns, under the command of Ismail Hakkı, surrendered on Oct. 30, 1918, to Lieut.-General Sir W. R. Marshall, this victory opening the road to Mosul and leaving the greater part of Mesopotamia in the hands of the British. The operations which led to these results were begun on Oct. 23, when the Turks were entrenched in positions of considerable natural strength astride the Fatha Gorge, their right flank being protected by two commanding ranges of hills which, in view of the lack of water in the desert, could not be turned, while a direct attack on the main position was impracticable from the great losses it would have entailed. Hence General Marshall's plan was to turn the left of the enemy's position on the Tigris and force a crossing over the Lesser Zab so as to facilitate an attack in enfilade on the Turkish right bank positions and thereafter to clear the left bank and cut the line of retreat on Mosul by

the aid of the cavalry and light armoured cars operating along the left bank. The Turks were quickly compelled to abandon their position and on Oct. 25 a British column occupied Kirkuk. On Oct. 26 the 11th Cavalry Brigade, executing a fine manoeuvre in rear of the Turkish left, crossed the Tigris at a point some miles distant from Shergat and captured the Huwaish gorge. Simultaneously the light armoured car section cut the wire to Mosul, with the result that the Turkish army was completely isolated from its base headquarters. The Turkish rearguard which was now in position a few m. to the S. of Shergat was brilliantly attacked on Oct. 28 by a battalion of the Royal West Kent Regiment, the rearmost line of trenches being carried. Meanwhile Turkish reinforcements to the number of 2500, aided by artillery, tried repeatedly, but unsuccessfully, to break through the 11th Cavalry Brigade from the S. The enemy, however, was far from defeated, and moreover the British troops, who had been pressing steadily and continuously for nearly a month, were badly in need of rest. The 11th Cavalry Brigade had been in action without intermission for three days, marching and fighting under the most arduous conditions of climate and terrain. But the Turks were making frenzied efforts to break through to the N., and hence it was essential that there should be no relaxation of the British pressure. Despite all conditions, the 17th Division drove back the enemy's rearguard to the main body, which was disposed N. of Shergat in positions commanding a series of ravines, each of which had perforce to be crossed in the face of a galling fire. In the course of the British attack on these ravines, the enemy counter-attacked heavily and with such effect that at one place he reached the line held by the supporting battalions, but was then stopped and dispersed with heavy casualties by a vigorous British counter-attack. All the while the British force under Brig.-General Cassels barring the enemy's road to Mosul were holding positions N. of the enemy's main body, which therefore lay between it and the British main body. The protracted nature of the fighting in the ravines gave the enemy's reinforcements time to move down from the direction of Mosul and develop a serious threat against General Cassels' right flank. But though the enemy posted mountain and machine guns on the high bluffs near Hadraniya, he was driven out of

these positions by a dashing movement on the part of the 7th Cavalry Brigade, the 13th Hussars galloping across the open and dismounting right under the bluffs to carry the position at the point of the bayonet. The enemy lost 1000 prisoners in this action, besides which his avenues of escape northward were effectively blocked. Caught as in a vice, with his men packed in ravines, which were now raked by our guns from across the Tigris, Ismail Hakki found his position hopeless, with no kind of relief in sight. At dawn on Oct. 30, when the British troops were on the point of renewing the attack, white flags appeared all along the Turkish lines, and shortly afterwards the Turkish Commander surrendered in person. In this way ended the last battle fought in the Great War by a Turkish army. The captures during the operations were 11,322 prisoners, including 643 officers, 51 guns, 130 machine guns, 3 paddle-steamers, a complete bridging train, together with 2000 animals, and large quantities of gun and rifle ammunition, bombs, and war material of all kinds. General Marshall at once despatched his cavalry towards Mosul, but when within a short distance of that tn. news of the armistice with Turkey (Oct. 31) was received, and the tn. was then occupied as a deterrent to disorder.

Tilak, Bal Ganghadar (1856-1920), Indian nationalist, a Brahman; b. at Ratnagiri, Bombay Konkan; son of education official. Educated Deccan College; LL.B., 1879. Founded, 1880, *Mahratta* and *Kesari* newspapers. Fervently anti-British and anti-Moslem. Became famous in 1897, a member of Bombay legislature; imprisoned for sedition. Imprisoned 1908-14 for commendation of murder. Controlled National Assembly during Great War; bound over, 1916 and 1918. Only once in England: 1918, when he brought an unsuccessful action for libel against Sir Valentine Chirol. Later, attacked his old friend Mrs. Besant. Died in Bombay, Aug. 1.

Tilburg, a tn. of N. Brabant prov., Holland. It is a great industrial centre, manufacturing cloth, woollens, soap, leather, etc. Pop. about 69,000.

Tilbury Fort and Docks, a fortification in Essex, England, on the Thames opposite Gravesend, enclosed by a moat. Originally built by Henry VIII., it was enlarged by Charles II. The troops raised in anticipation of a Spanish invasion were reviewed here (1588). The docks (716 acs.), which lie 1200 ft. above Tilbury Ness, opposite Gravesend, 26 m. below London Bridge and about the same distance from the

Nore, were opened in 1886, and formerly belonged to the London and India Dock Company, but are now under the control of the Port of London Authority. The great development of trade since 1886 has rendered frequent changes necessary. The recent extensions were begun in 1917, when the Port of London Authority extended the main dock 1450 ft. These extensions, which were completed in 1928-29 at a cost of £2,500,000, enable London to compete with Liverpool and Southampton for the largest ocean-liner traffic. They comprise a new entrance dock, 1000 ft. x 110 ft., with a depth of 45½ ft. at high water and a low-water depth of 38 ft. on the sills; communicating with this, a dry dock 750 ft. x 110 ft., large enough to accommodate the largest liners; and a passenger landing stage for the largest ocean-going steamers.

Tilden, Samuel Jones (1814-86), an American lawyer and statesman, *b.* at New Lebanon, New York. He was a famous Democratic leader, and in 1874 became governor of New York. He endowed a free library in New York. He was Democratic candidate for President and was believed to be elected, but a special commission decided that the disputed votes of Florida, South Carolina and Louisiana should go to R. B. Hayes, his Republican opponent, who was thereupon declared president. *See* TAMMANY HALL and SOCIETY.

Tilden, Sir William Augustus (1842-1926), a well-known Eng. chemist who, after teaching chemistry at Clifton College for eight years, was made professor of chemistry at Birmingham in 1880. He was later called to the Royal College of Science, London, and was elected a fellow of the Royal Society. His chemical work dealt mainly with the constitution of the terpenes (*q.v.*) and with various problems of physical chemistry.

Tilden, William Tatem, American tennis champion and author, *b.* at Germantown, Pa., Feb. 10, 1893. Educated at Germantown Academy and the Univ. of Pennsylvania. He was World's Champion of Lawn Tennis in 1920, 1921, and again in 1930, and with F. T. Hunter won the Men's Doubles at Wimbledon in 1927. He has been for ten years a member of the U.S. Davis Cup Team. In 1931 he became a professional player and was American Professional Champion. Writings include: *It's all in the Game: Tennis Tales*, 1922; *The Common Sense of Lawn Tennis*, 1925; *Match Play and the Spin of the Ball*, 1928; *Me—the Handicap*, 1929; *Glory's Net* (novel), 1930.

Till, see BOULDER CLAY.

Tillemont, Sébastien Lenain de (1637-98), a Fr. ecclesiastical historian, *b.* at Paris. At the age of twenty-three he entered the episcopal seminary of Beauvais. In 1672 he became subdeacon, then deacon, and in 1676 he received priest's orders. In 1681 he visited Flanders and Holland; and in 1682 undertook the charge of the parish of St.-Lambert, but soon gave it up at the desire of his father. The principal works of T. are his *Histoire des Empereurs*, published in 6 vols., the first four during the author's life at intervals from 1690 to 1697, the remaining two after his death, in 1701 and 1738; and his *Mémoires pour servir à l'Histoire Ecclésiastique*, which extended to 16 vols., of which the first appeared in 1693, and the fifth was in the press at the time of his death. These five volumes came to a second edition in 1701-02, and were followed in 1702-11 by the remaining eleven.

Tillett, Benjamin (*b.* 1860), British Labour leader and politician; *b.* in Bristol and began his career in a brickworks, later joining the Royal Navy. Subsequently organised the Dockers' Union, of which he became the general secretary. It was T. who largely organised the historic dock strike of 1889. At that time dock labourers were earning 4d. an hour and were compelled to wait about for long periods on the chance of being called upon to take a job or to tramp twenty miles to Tilbury for work. When the dockers struck for 6d. an hour and more reasonable hours of work, almost the whole country sympathised with their cause. T. pub. a short history of the Dockers' Union in 1910, and also his *Memories and Reflections* in 1931.

Tillotson, John (1630-94), Archbishop of Canterbury, *b.* at Halifax, of a Calvinist family; educated at Cambridge. At the Restoration he conformed to the Established Church and became chaplain to Charles II. (1666). In 1672 he became Dean of Canterbury, in 1675 Canon of St. Paul's, in 1689 Dean of St. Paul's, and in 1691 Archbishop of Canterbury. He was a strong anti-Catholic, and published *Rule of Faith* (1666), four lectures on the Socinian controversy.

Tilly, Johann Tzerclas, Count von (1559-1632), *b.* in Brabant and brought up by Jesuits. He served in the Spanish army in the Netherlands. Later, he left the Spanish service for Austria, and in 1607 became general of the Bavarian army and Catholic League, greatly distinguishing himself during the Thirty Years' War. He won the great battle of White Hill, near Prague, in 1620, and was also victori-

ous at Wimpfen, Stadtlohn, Wiesloch, and Kochst. In 1630, T. was appointed commander-in-chief of the imperial forces, and besieged and took Magdeburg, after a fierce struggle. Four months later, however, he was defeated at Breitenfeld, and shortly after, again on the banks of the Lech, where he was mortally wounded, and d. at Ingolstadt the following day. See Klopp, *Tilly im 30-jährigen Kriege*, 1861; Keym-Marcour, *Johan Tycerclaes Graf v. Tilly*; Count Villermont, *Tilly, ou la Guerre de Trente Ans*, 1859.

Tilsit, a tn. of E. Prussia, on the Memel (Niemen). There are iron foundries, glass, cloth, and machinery manufs., and trade in grain, coal, cattle, etc. Here Napoleon I. concluded treaties with Russia and Prussia in July 1807. Pop. about 50,000.

Timæus (c. 352-c. 256 B.C.), a Greek historian, was the son of Andromachus, tyrant of Tauromenium in Sicily. He was banished from Sicily by Agathocles, and passed his exile at Athens, where he had lived fifty years at the time when he wrote the 34th book of his History. This, his greatest work, was a history of Sicily from the earliest times to 264 B.C. See J. B. Bury, *The Ancient Greek Historians*, 1909.

Timæus of Locri, a Pythagorean philosopher contemporary with Plato. To him is usually ascribed the work *περί τῆς τοῦ κόσμου ψυχῆς* ('Concerning the Soul of the Universe'), written in the Doric dialect. It deals with the same subjects as Plato's dialogue *Timæus*.

Timaru, a seaport of S. Island, New Zealand. It manufactures flour and woollengoods. Pop. (1929est.) 17,890.

Timber is loosely classified as hardwood from Dicotyledonous trees and softwood from Gymnosperms. Owing to the great variations in hardness, even in wood of the same species of tree, this classification is misleading. The grain of T. is determined by the direction and arrangement of the tissues and the width of the annual rings. The texture is close or open, according to the diameter of the wood vessels. Experts can frequently classify T. by noticing the colour, hardness, weight, annual rings, or their absence, and the size and distribution of the wood vessels. Microscopic examination may be needed to supplement macroscopic observations. Felled T. trees should be removed immediately to the saw-mills or to storagesheds. The freshly-felled tree contains moisture which must be removed before the wood can be converted into useful T. This removal of moisture is the process of seasoning, a long, slow, natural

process that can be greatly expedited artificially. Natural seasoning is accomplished by storing the T. in a shed free from draught, provided with air circulation, and sheltered from the sun. Whole logs seasoned in this way remain wet in the middle and when sawn into pieces warp, owing to shrinkage, and split. Even for outdoor use such logs are less satisfactory than unseasoned wood, being liable to swell and change shape.

In the earlier part of the nineteenth century, smoke kilns were used in France for artificial seasoning, and steam and smoke passed through holes in the floor of the kiln and escaped through flues. Subsequently various kilns have been invented, and the most modern types provide for thermal circulation of air and the condensation of moisture by cold pipes or sprays. T. of different thicknesses can be dried in different compartments, each provided with separate controls of air circulation, temperature, and humidity. Seasoning increases the durability of wood, since decay cannot take place in the absence of moisture. Air also favours decay, and, in consequence, deeply buried or submerged wood is protected by the absence of air, while the parts of telegraph and other poles, of fences, and of wooden piles just above the surface of the soil, or of the water, decay most rapidly. T. exposed to conditions favouring decay, to attacks of insect-borers, and of ship-worms, to the growth of fungi, to mechanical abrasions, and to fire, should be preserved. The Gks. and Roms. killed superficial wood pests by charring to a depth of one-eighth to one-half an in. This decreases the strength of the T. Recent preservative measures lie in thoroughly brushing the surface with special paint, kalsomine, or other preservative. More effective is the method of dipping the wood into a bath of the preservative and making it penetrate deeply into the tissues. Creosote oil is one of the best general preservatives. Oak is suitable for use indoors and out; walnut, maple, sycamore, and beech only in dry places. Ash, one of the best tough, pliable woods, is extensively used in aircraft, and in sports apparatus.

Consult H. S. Betts, *Timber: Its Strength, Seasoning, and Grading*; W. S. Jones, *Timbers: Their Structure and Identification*; Angus D. Webster, *British-Grown Timbers*.

Timber (in Law). In real property T. means oak, ash, and elm by general custom, and various other trees by local custom, e.g. beech is T. in Bucks, but not in Oxford. It

becomes important to consider what T. denotes when construing the powers of a tenant-for-life under a settlement (*q.v.*). A tenant-for-life, unless expressly authorised, is liable for *Waste*, and felling T. is an act of *Voluntary Waste*. Neither T. nor *germins* (i.e. T. trees under twenty years) may be cut by a tenant-for-life, except that he may cut *germins* for necessary thinning of overgrown plantations and, on recognised 'T. estates,' he may periodically cut so much T. as by local usage is regarded as annual fruits of the land so cultivated. Since the Settled Land Acts, the tenant-for-life, even though impeachable for waste, may cut and sell T., most of the proceeds of which must go to 'capital money' for the benefit of the inheritance, and the residue as rents, and profits to himself; if not impeachable, he takes all the proceeds.

Timbrel, or Tobret, a Hebrew musical instrument, like the modern tambourine. It was used by Miriam after the passage of the Red Sea, and by David when he danced before the Ark.

Timbucktoo (Timbuktu, Timbuctoo, or Tombouctou), a tn. of the colony of French Sudan, near the Sahara, 9 m. N. of the main stream of the Niger. Its position makes it a focus of caravan routes between Algeria, Morocco, and Tuab, and of traffic on the Niger, and it thus has considerable importance as a trade centre. It exports ostrich feathers, gums, salt (from Taudeni), and kola-nuts to Senegal, the Guinea Coast, and Morocco. Most of the houses are of straw and earth, but there are a few brick buildings, some mosques and schools, and a citadel and forts. In 1904 it combined with Zinder-Chad to form the military territory of the Niger. In 1920 it was formed into a military territory, incorporated in Upper Senegal-Niger, but in 1923 was converted into a civilian territory, under a lieutenant-governor. Pop. 6118.

Timby, Theodore Ruggles (1822-1909), American inventor; *b.* April 5, at Dover, N.Y. Spent youth on a farm. In 1841, exhibited, at Washington, model of revolving battery; in 1843, made model of marine turret. Received little encouragement—either from U.S. gov. or from Napoleon III., whom he approached. Patented turbine water-wheel, 1844. Devised method of firing heavy guns by electricity, 1861. In 1862 his idea of marine battery was embodied in the ship *Monitor*.

Time and Time Measurement may be determined by reference to some regular occurrence of any natural phenomenon. Thus the day is deter-

mined by the apparent revolution of the sun and the year by the rotation of the earth on its axis. *Sidereal T.* is employed only in astronomical work, for definition of the *sidereal day*, which, unlike the solar day, is of constant length (*see infra*). *Apparent T.* is taken from the revolution of the sun, the solar day (*see infra*) being the interval between two consecutive southings of the sun. The mean solar T. is the average of the apparent T., the maximum divergence being about sixteen minutes. T. can easily be determined by travellers by observing the transits of known stars across known vertical circles. At sea, the method usually employed is to note the altitude of a *Nautical Almanac* star, and the latitude, and from these, together with the T. indicated by the chronometer, the T. can be computed. Local T. varies with the longitude, it being one hour in advance of or behind the true Greenwich T. for every 15° to the E. or W. of Greenwich respectively. Owing to the confusion from the various local Ts., a standard T. has been introduced, the Greenwich T. being taken as the standard.

Time Measurement.—The ultimate standard to which all systems of T. measurement are referred is *sidereal T.* The *sidereal day* is defined as the duration of a complete rotation of the earth on its axis relative to the stars. The *sidereal day* begins at a given place when the *First Point of Aries* (*q.v.*) is on the meridian. One of the duties of the Astronomer-Royal is to provide the nation, and, as we shall see, the civilised world, with a T. scale. A very accurate clock, known as the *sidereal clock*, is checked daily by astronomical observation of the instants when certain stars, known as clock stars, cross the meridian. In actual practice, time is measured by the length of the *mean solar day*. A solar day is the duration of a complete rotation of the earth on its axis relative to the sun. The length of a solar day varies because the earth's orbit round the sun is elliptical and because the earth's axis is not perpendicular to the ecliptic (*q.v.*) or the plane of its orbit. For the purposes of time measurement clocks are referred to the *mean solar day*, which is divided into twenty-four hours. The length of the mean solar day is constant and it refers to the duration of a complete revolution of the earth on its axis relative to an imaginary body, the mean sun. The zero of this time measurement is the instant when the mean sun crosses the meridian at a given place. In England this place is chosen as Greenwich,

and whereas the zero of T. measurement was formerly referred to the instant at which the mean sun crossed the meridian in the cap. of a given country, it is now the implicit common practice to refer all T. measurements to Greenwich. What is known as Greenwich Mean T. (G.M.T.) is T. measured from the zero of the Greenwich mean solar day. Formerly this day began at noon, but astronomers have now adopted a day of twenty-four hours which begins at midnight; this day has been adopted quite generally on the Continent, but so far the Eng. have been reluctant to make the necessary changes involved in civil life, and for legal purposes the zero of G.M.T. is noon. On the Continent *Mid-European* T. is fixed as one hour fast on Greenwich, while in Eastern Europe the standard of T. is *East-European* T., two hours fast on Greenwich.

The checking of G.M.T. from sidereal T. is a matter of astronomical computation (*vide Whitaker's Almanack*). The advent of wireless has simplified the regulation of clocks by means of the Greenwich standard clock, since T. signals are broadcast via the P.O. wireless station at Rugby at 10 a.m. and 6 p.m.

See HOROLOGY; SUNDIALS. For T. in relation to space see QUANTUM THEORY; RELATIVITY; SPACE-TIME. See also Bolton, *Time Measurement*, 1924.

Time Recorders are instruments for checking the time of arrival and departure of employees at their places of employment. Several systems are in use, e.g. signature, key, card, etc. The essential feature of the machine in each case is a clockwork arrangement that works a printing mechanism which is set into operation by the employee. The 'Kosmoid' recorder gives the best illustration of the signature system. In this recorder the clock drives a disc which is graduated into sixty divisions, each division representing a minute. This disc actuates one graduated for the hours, the hour disc being released one division for each revolution of the minute disc. The employee signs his name on a strip of paper which passes through the top of the recorder, he then presses a lever, thus bringing the paper into contact with the discs which print the time opposite the signature. When the lever is released the mechanism moves the strip forward so as to allow room for the next signature, the roll being collected on a stock drum. In the key method, a key with number in raised figures is provided for each employee.

Time-tables, see BRADSHAW, GEORGE.

'Times, The.' This daily newspaper was founded in 1785, under the title of *The Daily Universal Register*, by John Walter, mainly in order to prove the advantages of the 'logographic' process of setting up type by units consisting of whole words or groups of letters as well as by single letters. The process failed and was quietly discarded; but the newspaper succeeded, especially after Jan. 1, 1788, when it assumed the title of *The Times*. Walter's chief principles were to sell his paper cheap (it began at 2½d., and was soon raised to 3d.) and to trust to advertisements for profit; to publish it early every morning, before its rivals; to make it 'like a well-filled table,' with something suited to every palate; and, most of all, to spare no expense or trouble in organising his own news service. In 1802 he was succeeded as editor, and in 1803 as sole manager, by his younger son, John Walter II., under whom the paper maintained, through many struggles, its complete independence and immensely increased its circulation and power. Through the Napoleonic wars it frequently pub. news before the Gov. had received it; and its staff of writers, which included a young clergyman, Peter Frazer, Edward Sterling, and John Stoddart, made the leading articles a political force respected both at home and abroad. Stoddart was appointed editor of the paper. His fanatical hatred of Napoleon was valuable while the Fr. wars were in progress; but after Waterloo his violence and difficult disposition led to a break and he was succeeded in 1817 by Thomas Barnes, who held the chair till 1841 and brought the paper to the height of its reputation and power. Himself a vigorous writer, he employed Lord Brougham, Benjamin Disraeli, Sterling and others in expounding an independent policy, which inclined towards conservatism, but opposed slavery, supported Queen Caroline against King George IV., backed the Reform Bill and advocated the repeal of the Corn Laws. In 1834 Lord Lyndhurst, then Lord Chancellor, declared Barnes to be 'the most powerful man in the country.'

Meanwhile the news service at home and abroad was made the best that money, care and audacity could provide; the advertisement department was sedulously cultivated; a strong feature was made of City news and comment, and Thomas Moore, Macaulay, Thackeray and other men of letters gave attention to literature and the arts. The mechanical side was also developed to keep pace with

the increasing circulation. In 1814 John Walter installed the Koenig press, the first steam printing press ever used in England; and in 1827 this was succeeded by a press invented by Applegath and Cowper, two engineers on the staff of *The T.* In 1841 Barnes died in harness, and was succeeded by John Thaddeus Delane, then a youth of twenty-three. An untiring worker, swift and courageous in decision, independent in mind and character, very popular in society, and trusted by both political friends and opponents, Delane took charge of 'a mighty world power,' and so ruled it that thirty years later he was said to 'possess an empire which is co-extensive with the area of civilisation.' In his time the final repeal of the stamp duty on newspapers (1855) and of the duty on paper (1861) opened the way to new and low-priced journals; but the power and circulation of *The T.* were scarcely affected. During the Crimean War, having organised its war correspondence on a scale never before attempted, it ruthlessly exposed, chiefly through the pen of William Howard Russell, the faults in the conduct of the fighting and the equipment of the troops; and it was mainly through Russell's articles that Florence Nightingale was moved to go upon her mission, in which she was assisted by a large fund raised by *The T.* Independent of party ties, Delane took his own political line. In 1846 he practically forced upon the hesitating gov. the repeal of the Corn Laws; and in the main he might be described as a Palmerstonian Liberal. Among his political writers were Henry Reeve, Robert Lowe (afterwards Lord Sherbrooke), Henry Wace (afterwards Dean of Canterbury), Roundell Palmer (afterwards Lord Selborne), George Brodrick (afterwards Warden of Merton College, Oxford) and Leonard Courtney (afterwards Lord Courtney of Penwith). Disraeli, Vernon Harcourt, Mark Pattison, James Davison, the musical critic, Tom Taylor, and John Oxenford also served him in various capacities. John Walter II. having died in 1847, his son, John Walter III., succeeded him as chief proprietor, and did much to foster the mechanical side in which, as of old, *The T.* was a pioneer. In 1848 came the first rotary printing-press, invented by Applegath, and in 1866 the famous Walter press, which remained in use for nearly 30 years; and in 1879 (not long after Delane's retirement) Kastenbein, working in *The T.* office, perfected the first typesetting machine. Delane was succeeded by Thomas Chenery, who held office till his death in 1884, to be

followed by G. E. Buckle, then twenty-nine years of age. The outstanding feature of Buckle's reign was the vigorous and successful opposition of the paper to Gladstone's proposals for Home Rule. The articles on 'Parnellism and Crime' contributed by a brilliant Irish writer, John Woulfe Flanagan, were the chief occasion of the Parnell Commission, which was appointed to examine the attacks made by *The T.* on Irish leaders and to investigate the truth about a letter attributed to Parnell. The letter was found to be a forgery, but most of the charges made by *The T.* were pronounced true. In 1889 C. F. Moberly Bell was appointed manager of *The T.* In spite of the increased circulation of cheaper journals the paper was still, contrary to general opinion, extremely prosperous; but the costs of the Parnell Commission had been enormous; the resources of the paper were being wasted; and after the death of John Walter III., in 1894, a system of ownership by which the printing business and the newspaper were held separately made efficient organisation difficult. Moberly Bell tried various subsidiary means of raising money in order to avoid lowering the quality of the journal, among them *The Times Book Club*, which was to involve the paper in a long and bitter conflict with the publishers. In the end disagreement among the various owners of the paper led to a lawsuit, in which the courts ordered a dissolution of partnership, and with it a sale of the assets, property and effects.

In July 1907, after 122 years, *The T.* was for sale. The controlling interest was bought, through Moberly Bell's negotiation, by Lord Northcliffe, who, with Moberly Bell as manager, immediately began to equip the printing office with the newest machinery and to make certain changes in organisation and detail. *The T.* had resumed its old position in the van of newspaper progress when in 1911 Moberly Bell died at his desk. In 1912 Buckle retired, a few weeks before the 40,000th number of *The T.* was pub. In his reign the journal proper had been reinforced by the *Literary Supplement* (1902), the *Educational Supplement* (1910) and the *Engineering Supplement* (1905). He was succeeded by the present editor, Geoffrey Dawson (*q.v.*). In May 1913, the price of *The T.* was reduced to 2d.; and in March 1914, to 1d. In one night the circulation was more than trebled; and it was with a daily circulation of 150,000 that it faced the outbreak of the Great War. During the War the paper did more than maintain the reputation of its

news service; and it could point to a long list of suggestions first made in its columns which the Gov. adopted. Among other things, it effected the unification of the Red Cross Society and the St. John's Ambulance Association, brought the combined bodies into close touch with the Army Medical Corps, and raised by *The T.* Red Cross Fund more than £16,000,000 for the sick and wounded of Britain and her Allies. Among its many subsidiary publications in connection with the war may be mentioned its War Atlas, *The T.* History and Encyclopædia of the War, and *The T.* Broadsheets—passages of Eng. literature printed on single sheets of paper and distributed by millions among the troops. In 1919 Dawson resigned and was succeeded for a time as editor by Wickham Steed. In 1921 *The T.* raised more than £170,000 for the preservation of Westminster Abbey.

In August 1922 Lord Northcliffe d.; in October the ownership of *The T.* was bought by John Walter (fourth of the name, and great-grandson of the founder) and Major the Hon. John Jacob Astor, who became Chairman of The Times Publishing Company; and in January 1923 Geoffrey Dawson returned to the editorial chair. In 1925 *The T.* raised more than £250,000 for the preservation of St. Paul's Cathedral. In May 1926 came the General Strike, and *The T.* was the only London daily newspaper which produced a number every day throughout the strike. The number of Wednesday, May 5, 1926, is a single small sheet, printed on both sides by multigraph machines, which had been secretly installed in the office. So soon as the strike was over *The T.* opened a fund for the expression of public gratitude to the police; and nearly £250,000 was subscribed in less than three weeks.

Timgad, a decayed city of Algeria in the prov. of Constantine, 64 m. S.W. of the tn. of Constantine. It was founded by Trajan about A.D. 100.

Timoleon (c. 411–337 B.C.), a great Gk. democrat, came of one of the noblest families of Corinth. His whole life was spent in a ceaseless struggle for liberty, and in his youth this led him to a sad excess—the murder of his own brother Timophanes, who was trying to make himself tyrant of Corinth. In 344 B.C. the Gk. cities of Sicily applied to Corinth for aid against the Carthaginians, and T. was sent with a small force. He took possession of Syracuse, and set about the establishment of democratic gov. in all the Sicilian colonies. Meanwhile the Carthaginians landed at Lilybæum

(339). T. was not able to collect more than 12,000 men, but with these he marched against the Carthaginian troops and totally defeated them. A treaty was concluded in the next year, and T. continued his work. The flourishing state of Sicily at the time of his death shows how beneficial his influence was. See Holden's ed. of Plutarch's *Life of Timoleon* (1889).

Timon the Misanthrope, an Athenian who lived in the time of the Peloponnesian War. On account of ingratitude and disappointments suffered, he secluded himself from the society of all but his friend Alcibiades. He is the central figure of Shakespeare's *Timon of Athens*.

Timor, or Timur, an island of the Malay Archipelago, largest and most easterly of the Lesser Sunda group. In 1859 a treaty divided the island between Portugal and Holland, the boundaries being finally arranged by arbitration in 1914. Portuguese T. includes the N.E. of the island with the Ocussi enclave, and the island of Pulo Kambing, Dilly (Delhi) being the cap. and chief port. Area 7450 sq. m. Dutch T. comprises most of the S.W., including the islands Rotti, Peman, Savu, Sumba, Allor, and E. Flores, with Kupang as the cap. Area 26,410 sq. m. The soil is dry and not very fertile, and the country mountainous. Mt. Atlas (12,000 ft.) and Mt. Kabalaki (10,000 ft.) being the culminating peaks. Among the chief exports are coffee, cocoa, copra, sandalwood, bêche-de-mer, and cattle. A noted breed of ponies is reared here. Pearls have been found off the S.W. coast. The staple article of food is sago. Pop. (Dutch) (1927) 1,168,246; (Portuguese) 398,518. See H.M. Stationery Office, *Peace Handbook*, No. 80, *Portuguese Timor*, and No. 86, *Dutch Timor*, 1920.

Timor-Laut, a collection of islands belonging to the Malay Archipelago, 265 m. E.N.E. of Timor, belonging to the Dutch. The chief islands are Yamdena, Selaru, and Larat. The chief industries are agriculture, cattle-raising, and trepang-fishing. Area of group 2060 sq. m. Pop. 24,858.

Timotheus, an Athenian general of fourth century B.C. In 375 he defeated the Spartan fleet and took Corcyra, and in 373 was sent to relieve Corcyra, then besieged by Sparta. He served the king of Persia for some time, but returned to Athens, and in 366–65 took Samos, and in 363–62 he besieged Amphipolis. He was ruined by an unjust charge preferred by Chares in 355.

Timotheus of Miletus (c. 446–357 B.C.), a Gk. dithyrambic poet and

musician. He added an eleventh string to the lyre and thus incurred the displeasure of Athens and Sparta. His poems, on mythological and historical subjects, are daring in treatment and style. His fragments are printed in Bergk's *Poetae lyrici graeci*.

Timothy, the young friend and fellow-labourer of St. Paul. He was a native of Lystra, his mother Eunice being a Jewess and his father a Gk. He accompanied St. Paul on the second missionary journey, and the lives of the two are henceforward closely connected. He was left as the apostle's representative at Ephesus, where he received two epistles from him. Eusebius says that he met his death there in a popular riot.

Timothy, Epistles to, form with the Epistle to Titus the group known as the Pastoral Epistles, which consist of elaborate instructions for the appointment of officers and the pastoral care of the Christian churches. They show many points of contact with one another and with the other Pauline epistles, but there are numerous departures from the latter both in diction and subject-matter. They are private letters of an official nature. One of the most disputed questions is their authorship. In spite, however, of many attempts to disprove the Pauline authorship, the balance of probability still rests decidedly with the traditional view. The only considerable objection is the difficulty of finding a time and place for these epistles in the recorded life of St. Paul, and it is now usual, therefore, to place them somewhere in the unrecorded portion. The second epistle is, accordingly, placed during a second imprisonment of Paul, of which no record has remained. Many good reasons have been adduced in support of the hypothesis that St. Paul's activities did not end with the first imprisonment, but that much of his evangelical work took place after that date. For a full description of the pros and cons of this discussion, see articles in Hastings's *Dict. of the Bible*, and the *Temple Dict. of the Bible* (1910).

Timūr Beg, or Tamerlane (1335-1405), a sultan of Samarkand, b. at Kesh, of Mongol origin, a direct descendant of Genghis Khan. His father was the chief of the Turkish tribe of the Berlas. At the age of twelve, he was a soldier, and on the death of his father he began a life of conquest. He first assisted and then attacked Husein, Khan of Northern Khorasan and Jagatal, finally supplanting him in 1369. He made Samarkand his cap. and rapidly made himself master of the whole of Turkestan and part of Siberia. He next attacked N.E. Persia. After a

series of bloody and cruel conflicts, the whole of Persia, Georgia, Armenia, and the neighbouring states accepted him as suzerain. Timūr then turned his arms towards the N. and overran Kiptshak. During the years 1392-96 he was employed in consolidating these conquests. He then declared war against India, and in 1398 defeated the Indian army near Delhi. He later came into conflict with Europeans, when he attacked and took Smyrna, the property of the Knights of St. John. He died at Otrā on the Jaxartes as he was marching to attack China. His name Tamerlane is a European corruption of Timūr-lenk (Timur the Lame). He figures as the hero of Marlowe's great drama, *Tamburlaine*.

Tin, symbol Sn, atomic number 50, atomic weight 118.7, one of the seven metals of the ancients, occurs as the oxide—tinstone or cassiterite (SnO_2)—and is found in Cornwall, Austria, and New South Wales. The metal is prepared from the ore (see CASSITERITE) by roasting to remove arsenic and sulphur, followed by heating in a reverberatory furnace with anthracite. The T. so formed is re-melted and poles of green wood stirred in it. By this means impurities are carried to the surface in the form of a scum. T. is white and lustrous (sp. gr. 7.3), and melts at 232°C . It is crystalline in structure and when bent emits a curious crackling sound called the 'cry of tin.' T. is not acted upon by the air and is therefore used for tinning iron (see TINPLATE). T. readily dissolves in hydrochloric acid with evolution of hydrogen and the formation of stannous chloride (SnCl_2). It is not acted upon by dilute sulphuric acid but dissolves in the concentrated acid. Stannic oxide is formed in the hydrated condition (as β stannic acid [$\text{SnO}_2 \cdot \text{H}_2\text{O}$]) by the action of nitric acid on the metal, while aqua regia acting on the metal forms the tetrachloride (SnCl_4). T. forms two series of salts, the stannous, in which it is divalent, and the stannic salts, in which it is tetravalent. The stannic salts correspond with similar compounds of carbon and silicon, the oxide (SnO_2) is acidic, and the chloride is a fuming liquid. The stannous salts are strong reducing agents. The oxide (SnO) is basic but also acts as an acid-forming oxide towards strong bases. The alloys of T. are of great value, comprising gun metal (Cu and 8-14 per cent. Sn), bronze (copper and tin), phosphor bronze (1 per cent. phosphorus), pewter (Sn 80, Pb 20), solder, bell metal, as well as a large number of alloys with other metals such as

gold, iron, bismuth, etc. One of the best-known compounds of Sn is pink salt, $\text{SnCl}_4 \cdot 2\text{NH}_4\text{Cl}$, which is used as a mordant in dyeing. See PUTTY POWDER, etc.

Tinamou, any individual of the Tinamidæ, a family of game birds inhabiting the forests of tropical and southern America. They resemble partridges in appearance, but have little or no tail. Although their wings are short, they are able to fly with great speed.

Tinchebrai, a tn. in the dept. of Orne, N.W. France. T. was the scene of a battle between Robert of Normandy and his brother, Henry I. of England, in 1106, after which Normandy was annexed to the British crown. Pop. (1925) 3428.

Tincture, in heraldry, the colour of the field of an escutcheon. See HERALDRY.

Tindal, Matthew (c. 1653-1733), an Eng. deist, studied at Oxford, becoming fellow of All Souls (1678). After having joined the Church of Rome (1685), he returned to the Church of England (1688), and later wrote controversial pamphlets, which all met with vehement opposition from the High Church party. See Curll's *Memoirs*, 1734; Hunt, *Religious Thought in England*, ii. 431.

Tindale, William, see TYNDALE.

Tinfoil, see FOIL.

Tinned Meat, see CANNING.

Tinneveli, the chief tn. of the dist. of the same name, Madras Presidency, India. Headquarters of Protestant missions. It is famous for its temple to Siva. Pop. 44,800.

Tin-plates and Sheets. All iron and steel intended for tinning must first be pickled and then scoured to remove all dirt, for tin will not adhere to impurities. Pickling agents formed a well-kept trade secret, but to-day it is accomplished by sulphuric acid, the specific gravity of which is about 1.66. In order to prevent the oxidation of the surface of the molten tin and by way of a flux, grease is placed on top of the tin-bath. In old days a specially prepared beef-tallow was employed, then sal-ammoniac (NH_4Cl) was used under the name of muriate of ammonia. But to-day zinc chloride and palm oil hold the field. There are three chief processes by which the tin can be deposited upon the iron or steel sheet: (1) by the blanching process, (2) by fat tinning, (3) by electro-deposition. In the first-named alkali stannates are employed in a boiling solution, with the addition of granular tin. After washing and drying, the tinned article—usually small in size—is ready finished. Electro-tinning may be either performed by the feeble current set up by deposit-

ing the article to be tinned in an aluminium receptacle suspended in an ammoniacal solution, or else by a direct electrolytic process, using an alkaline solution of stannous chloride as the electrolyte and sheet of tin as the electrode. The most frequently employed process is, however, the fat-tinning, by which all the poorly tinned stuff for making 'canned goods' is provided. The amount of tin used for such goods is as low as 2 lb. of pure tin spread over about 63,000 square in. of the surface, whereas in the very best quality, such as is employed for dairy articles, the amount of metal may rise as high as 6 lb. for the same area. Sheets to be tinned by fat-tinning pass through several operations before they are completely finished. After being pickled and 'boshed,' they are close annealed at a bright cherry heat for about ten hours. After they have got quite cold, the sheets are cold rolled between two chilled rollers, which imparts a fine dense surface to the sheets. This process hardens them and necessitates a second annealing and a further pickling. Forty years ago the sheets were all hand-dipped, i.e. they were dropped first into the flux-bath and then were removed to the tin-pot covered with palm-oil. Then they were rapidly brushed and passed through a second similar pot at a slightly higher temperature. This unfortunately gave an uneven coating of metal, so that a great improvement was effected when the last pot contained rollers revolving in the palm-oil, which squeezed off any superfluous tin. This process is the one in use to-day. Plates larger than 21" by 30" are known as tinned sheets in the trade, and are made up as large as 36" by 72" or even larger if necessary. Terne plates are coated with a mixture of lead and tin, containing up to 25 per cent. tin. They are largely used for motor-car construction, such as wings and under-shields. They are also suitable for making articles which are not intended for containing foodstuffs, owing to the possible risk of lead poisoning.

Tintagel, a small village, 4½ m. from Camelford, in Cornwall, Eng. Near by is T. Head, a promontory 300 ft. high, on the Atlantic Coast, with the ruins of a castle famous in the Arthurian Romances. Some affirm that King Arthur was born here. Again, it is the impregnable and inaccessible retreat of King Mark. That a castle did exist here in pre-Saxon times seems certain, though the present ruins are mostly of a later, Norman structure.

Tintern Abbey, ruins, in the co.

of Monmouth, England, on the Wye, 4 m. N. of Chepstow. They date back to 1131, and were purchased in 1900 by the gov.

Tintoretto, Jacopo Robusti (1512-94), the chief painter of the later Venetian school, b. at Venice. He at first studied under Titian, but later he worked on his own account. Among his numerous works are: 'St. George Destroying the Dragon,' 'Christ Washing the Feet of the Disciples' (both in the National Gallery), 'The Miracle of St. Mark,' 'The Crucifixion,' 'The Marriage at Cana,' 'The Paradiso' (in the Doge's Palace, the largest picture in existence, 84 ft. by 34 ft.), 'The Golden Calf,' 'The Last Judgment,' and a series of fifty-seven works in the Scuola di San Rocco. T. also painted portraits with success. Among these are two of himself, one in the Uffizi Gallery, Florence, the other in the Louvre, Paris. The latter shows a grave determined face, rugged without coarseness, the inner fire patient in labour. Perhaps no writer has shown better appreciation of T. than Ruskin (*Stones of Venice*, etc.).

Tipperah, a dist. of Bengal, India, on the edge of the Ganges delta. Area 2499 sq. m. It exports large quantities of rice and jute. Cap. Comilla. Pop. 2,430,000.

Tipperary: (1) An inland co. in the prov. of Munster, Irish Free State, bounded by Galway and Offaly (King's co.) in the N., Cork and Waterford to the S., Leix (Queen's co.) and Kilkenny to the E., and Clare and Limerick on the W. To the N. and W. lies a mountainous region with Keeper Hill (2278 ft.), and in the S. are the Galtee Mts., with Galtymore (3015 ft.), the Knockmealdown Mts., and further E. the Slievecardagh Hills. The Bog of Allen adjoins Kilkenny, while in the S.W. lies the Golden Vale, one of the most fertile regions in all Ireland. The principal rivs. are the Shannon in the N.W. with Little Brosna and Nenagh, the Suir and the Nore in the centre, and S. Lough Derg, the N.W. boundary, is the only lake of any size. Agriculture is the chief industry, barley and oats are the main crops, potatoes and turnips also being grown; a considerable area is under pasture, and cattle are reared in large numbers. Dairy farming flourishes and there are a number of butter factories. There are also flour and meal mills. Coal, copper, lead, and zinc are found, also slate and limestone, but mining is very little carried on. The county is divided into a N. and S. riding, and returns seven members to the Dail Eireann. There are interesting remains of castles and ecclesiastical

buildings in various parts of the county, notably at Cashel, where there is a round tower, at Ardinnan, at Athassel (an Augustinian priory), at Holycross (Cistercian abbey), and at Felhard and Roscrea (abbeys). The county is one of those supposed to have been made by King John in 1210. It was granted to the earls of Ormonde in 1328, and was the last of the Irish palatine counties. The county tn. is Clonmel (8989), other tns. are Tipperary, Carrick-on-Suir, Nenagh, Thurles, and Cashel. The area is 1659 sq. m. Pop. (1926) 140,946, decreased through emigration. (2) A market tn., co. Tipperary, Irish Free State, 23 m. S. E. of Limerick, at the foot of the Tipperary Hills. In the fertile plain known as the Golden Vale, it is famous for its butter-making, and there is also a condensed milk factory. Not far from the tn. is the Glen of Aherlow, and just outside the tn. is New Tipperary, the village built by Mr. William O'Brien in 1890, for the Smith-Barry tenants who had to give up their holdings on account of the boycott. Pop. (1926) 5554.

Tippoo Sahib, see TIPU.

Tipstaff, an officer of the Supreme Court, whose duty it is to arrest and convey to prison persons committed by that court who are at the time actually present therein.

Tipton, a tn. of Staffordshire. It is engaged in coal mining and the manuf. of iron. Pop. (1931) 37,790.

Tipu, or **Tippoo Sahib (1749-99)**, son of Hyder Ali, succeeded his father as Sultan of Mysore in 1782. He had previously distinguished himself in the Mahratta War, 1775-79, and in the first Mysore War had defeated Braithwaite, 1782. As sultan he concluded a treaty with the British in 1784, but in spite of this invaded (1789) the protected state of Travancore. War followed, and in 1792 he was obliged to resign half of his dominions. But nothing daunted, he continued his intrigues, urging the Fr. to stir up war with England, the result of which was the storming of his cap., Seringapatam, by the Eng., during which T. himself was killed.

Tipulidæ, see CRANE FLY.

Tiraboschi, Girolamo (1731-94), an Italian historian, b. at Bergamo. He was a member of the order of Jesuits, and became professor of rhetoric in the University of Milan, 1755. Here he wrote *Vetere Humilitatum Monumenta*, 1766, but being appointed in 1770 librarian to the Duke of Modena, he completed his masterpiece, *Storia della Letteratura Italiana*, 1772-82.

Tirah Campaign, a war which took place on the Indian frontier, 1897-98. It was undertaken by General Sir

William Lockhart against the Afridis and Orakzais, who waged a perpetual guerrilla warfare, avoiding general engagements. After losing many walled and fortified hamlets in the Tirah dist. they opened negotiations for peace.

Tirana, a com. in the vilayet of Scutari, Albania. It is noted for its mosques. Pop. 14,500.

Tiree, see TYREE.

Tiresias, a blind Theban seer of Gk. mythology. The story goes that he was deprived of his sight by Athena, whom he saw bathing, but was afterwards endowed by her, in pity, with wonderful gifts of prophecy. He was consulted by Oedipus and Creon, and Odysseus descended into Hades to ask his advice.

Tirhut, originally a dist. of Bengal. In 1875, however, it was divided into the two dists. of Muzaffarpur and Darbhanga, new divisions being included in 1908. Area 12,600 sq. m. Pop. 9,700,000.

Tiridates, the name of a dynasty of Parthian or Armenian kings, five of whom are remembered in history. The two most important are Tiridates I. and II. *Tiridates I.* conquered his kingdom with the assistance of his brother, Vologesius. But Corbulo, from whom he had taken it, forced him to turn to Nero for assistance, whose suzerainty and paramount authority Tiridates was compelled to acknowledge. *Tiridates II.*, who was the son of Kosron, was educated at Rome, and won the friendship of the Romans by his military qualities. At the request of Licinius, Diocletian restored him to the throne of Armenia in 286. He was welcomed with enthusiasm by his people, anxious to be freed from the yoke of the Persians. Fortune, however, did not favour Tiridates long, for the Persians soon robbed him again of some of his richest provinces. In 296, however, the Romans replaced him on his throne. He embraced the Christian faith before his death in 314.

Tirlemont, a tn. in Brabant, Belgium. Manufs. are woollen goods and machinery. Pop. 20,500.

Tirpitz, Alfred Peter Friedrich von (1849-1930), Ger. grand-admiral; b. March 19, at Küstrin, son of one 'Gross-Justiz-Rat' T., of a Prussian landowning family. Attended the Realschule at Frankfurt-on-the-Main. Passed into the Prussian Navy in 1865, and for thirty years was almost continuously at sea. In the eighteen-seventies, T., a lieutenant-commander, prepared memoranda on torpedoes, which led to the establishment of a torpedo-section in 1885. In 1892 he was appointed to the naval staff at Berlin. Rear-admiral, 1895. In 1896, appointed to command Asiatic

Cruiser Squadron; under his direction Tsingtao became a Ger. naval base. On return home in 1897 he became Secretary of State for the Navy. In 1898 he presented to the Reichstag his first Navy Bill—the beginning of the serious growth of the Ger. Navy. Vice-admiral, 1899. His second Bill was brought in in 1900; it definitely started the naval armament 'race,' Admiral, 1903. Grand-admiral, 1911. At the beginning of the Great War he was still Secretary of State for the Navy; but he was on bad terms with his two naval colleagues, and did not succeed in his purpose of making full use of the navy from the beginning. He resigned March 15, 1916. Nationalist member of Reichstag, 1924-28; then retired to private life. Wrote: *My Memoirs*, 1919; also *Germany's Policy of Impotence in the World War*. Died at Ebenhausen Sanatorium near Munich, March 6.

Tirso de Molina (*alias* Gabriel Tellez) (1585-1648), Spanish dramatist, educated at the University of Alcalá de Hénarès. When he had taken his degree he left for Madrid, in order to take up the life of a dramatist. Molina, or Tellez, as he is more generally known, was very prolific, and wrote no fewer than three hundred comedies, which, taking into consideration the length of his creative period, works out at the rate of two plays a month. Tellez ended his life as a member of a religious order. He became prior of the monastery of Soria, where he d. at the age of sixty-three. Among his best-known plays is *Don Juan*, to which Molière was indebted.

Tirupati, a tn. of Madras, India, in the dist. of N. Arcot, 72 m. N.W. of Madras. It is celebrated as a place of pilgrimage, and has a wonderful hill-temple. Pop. 16,700.

Tiryns, an anct. tn. in Argolis, is said to have been founded by Proetus, who built the massive walls of the city with the help of the Cyclopes. Proetus was succeeded by Perseus, and it was here that Hercules was brought up. The remains of the city are some of the most interesting in all Greece. See Gardner, *New Chapters in Greek History*, ch. iv.

Tischendorf, Lobegout Friedrich Konstantin von (1815-74), a Ger. biblical scholar, b. at Lengenfeld in Saxony. He made a special study of N. T. criticism at the University of Leipzig, and in 1845 became professor there. He discovered the fourth-century Sinaitic Codex at the monastery on Mt. Sinai. His works include: editions of the Sinaitic Codex, 1862-63; *Editio VIII.* of the New Testament, 1864-72; the *Monumenta Sacra Inedita*, 1846-71;

and *Reise in den Orient*, 1846; *Aus dem Heiligen Lande*, 1862, which describe his journeys.

Tisi, Benvenuto, also called Garofalo (1481-1559), Ferrarese painter; b. at Garofalo, where he studied under Panetta. At Cremona, a pupil of Boccaccino; at Rome, of Giovanni Baldini; at Mantua, of Lorenzo Costa. Again at Ferrara, 1509-15, with Dosso Dossi; afterwards at Rome for two years, assisting with the Vatican frescoes. Family affairs recalling him to Ferrara, he and Dossi painted for Duke Alphonso I., in the Villa di Belriguardo and elsewhere. Painted 'Massacre of the Innocents' (1519) in church of St. Francesco, Ferrara. 'Betrayal of Christ' (1524) is his masterpiece. In 'Paradise,' he painted Ariosto between St. Catherine and St. Sebastian. 'Adoration of the Magi' in San Giorgio's, near Ferrara, and 'Peter Martyr' in the Dominican church, Ferrara, are by T. He was overtaken by blindness in 1550. Died in Ferrara, Sept. 6 or 16. Four of his pictures are in the National Gallery, London. Many are at Dresden; some in the Metropolitan Museum, New York.

Tissaphernes, a Persian soldier and statesman, the son of Hydarnes. He was satrap of Lower Asia in 414 B.C., and during the Peloponnesian War espoused the cause of Sparta, though without giving any assistance. His plans being thwarted by Cyrus, who helped the Spartans, he repaired to the king Artaxerxes II., warning him against his brother, and took part in the battle of Cunaxa. He harassed the retreat of the Ten Thousand, after which he resumed his old position as general-in-chief and satrap of Lydia and Caria. He then stirred up war with Sparta, but was beaten by Agesilaus near Sardis in 395.

Tisserand, François-Félix (1845-96), a Fr. astronomer. In 1892 T. was appointed director of the Paris Observatory. His *Leçons sur la détermination des orbites* was published in 1899, but his *Traité de mécanique céleste* (1888-96) is his most important work.

Tissot, James Joseph Jacques (1836-1902), a Fr. painter. T. passed some time in England, and did illustrations for London journals. He made his name as an illustrator of the Bible and of minor religious works.

Tissue and Tissue Culture. T. (Lat. *texere*, to weave) in general usage denotes either an interwoven fabric, or a connected series of statements, circumstances, or events. Biologically, a T. consists of associated cells having in common either form, function, both form and function, or other characteristics. Ts. may

be named severally according to the types of cells composing them, e.g. muscular and nervous Ts. of animals, and parenchymatous, prosenchymatous, and sclerenchymatous Ts. of plants; or according to their function, e.g. connective Ts. of animals, vascular and storage Ts. of plants; or according to their position, e.g. epithelial tissue of animals and dermal Ts., such as cork and bark, of plants. In the development of most vertebrate animals, the diverse Ts. are derived from cells of the embryonic layers formed by division of the fertilised egg-cell. Why certain cells should develop into nerve-cells, others into muscle, others into bone, and still others into very different Ts. has long been a matter of interest, but apparently before the present century no efforts were made to follow the behaviour of cells growing outside the body. Loeb (1902) grew epithelium on clotted blood in a glass vessel, and Harrison (1906-07) watched the growth of T. in lymph on a coverslip. These pioneers have been followed by a steadily increasing number of workers and the technique of T. C. has been considerably extended and improved. To follow microscopically the growth of T., a 'hanging drop' culture is made by suspending a minute piece of T. in a drop of suitable medium on a coverslip. This is fitted over a hollow in a glass slide and the junction of slide and coverslip sealed by vaseline, paraffin wax, or other suitable material. All the apparatus and the culture medium are first thoroughly sterilised, and the experiment carried out in a sterile chamber. The T. is then incubated at the normal temperature of the animal, and examined at frequent intervals. Some cells of practically all such cultured Ts. migrate by amoeboid movement (see AMOEBA) to the boundary of the fragment, and even wander into the medium. In a favourable medium, the cells divide actively (see CELL) until equilibrium is established between the cells and their environment. Division and growth then cease, but the T. remains alive and its cells again become active when transferred to a suitable medium. Many Ts. in culture become dedifferentiated, i.e. they lose the characteristic structure and appearance they possessed when forming part of the T. of the animal, and the new cells apparently are undifferentiated. Redifferentiation may be induced by the addition of a suitable factor; connective T. added to cultures of undifferentiated kidney T. causes the formation of kidney tubules. Epithelial and embryonic Ts. cultured separately become de-

differentiated, but when cultured in juxtaposition, differentiation is maintained.

That the lack of differentiation of Ts. in culture is only apparent may be shown by implanting some of the animal T. in an appropriate position in the body of a very closely related animal. The graft soon shows differentiation into a form similar to the original one. Epithelial T. from a mouse, and apparently undifferentiated in culture, when grafted on another mouse became ordinary epithelial tissue and developed a horny layer. Such results show that some invisible differentiation, probably a chemical one, must exist in the cell. Experiments made to determine the stage at which this differentiation takes place in the animal show that early in development the destiny of the cell is determined by its environment. For instance, the nerve cord of Amphibia is formed by part of the epidermal T. If some of this T. be removed from the embryo, before gastrulation occurs, and exchanged with a piece of ordinary epidermis, the latter grows into nerve cord and the former into ordinary epidermis. After gastrulation, invisible differentiation has occurred and the exchange of T. cannot be made successfully. The inorganic environment also affects T. formation. The embryonic cells in a hen's egg will grow and divide at a subnormal temperature but will not become differentiated. The chemical composition of the medium affects the appearance and mode of development of Ts. The notochord of a frog develops differently in solutions of sugar and of urea. The addition of embryonic extracts to T. cultures usually accelerates growth and division, whereas the addition of an extract from adult animals has no apparent effect except when made from injured Ts. The effect is then remarkably stimulating for a short period, but soon ceases. This result is comparable to the sequence of changes in the healing of a clean cut in the flesh of a healthy animal.

Consult G. R. De Beer, *Experimental Embryology*; T. S. R. Strangeways, *Tissue Culture in Relation to Growth and Differentiation*, and *The Technique of Tissue Culture 'in Vitro.'*

Tista, a riv. of India, flowing through Sikkim and Bengal into the Brahmaputra. It rises in Tibet. Length 200 m.

Tisza, Kálmán (1830-1902), a Hungarian statesman, b. at Geszt. He was elected to the Diet in 1861, and became leader of the more Radical party in the house, and when

owing to his influence a new party had been formed out of Deak's followers, the Syabadelvii Party, or Free Principles Party, he became prime minister. It was mainly owing to T. that Austria remained neutral during the Franco-Prussian War, and Hungary owes to him, besides many reforms, a consolidated gov.

Tisza of Boros-Jerő and Szeged, Istyvan (Stephan) Emmerich Ludwig Paul, Count (1861-1913), Hungarian statesman; b. April 22, at Budapest; son of Kálmán Tisza, Hungarian Premier, 1875-90. The family were Calvinist. Educated: Berlin; Heidelberg; Budapest. Entered the Hungarian Chamber, 1886. Employed in Ministry of Interior; an agrarian specialist, he pub. *Magyar Agrár-politika* in Ger. and Hungarian, 1897. Persistent obstruction, especially of Army Bills, by the Kossuth party, led to supersession of the Premier Szell (who was considered unequal to the situation) by T., Oct. 31, 1903. He passed stringent new rules of debate; but, being deserted by the Andrassy faction, he was unable to carry on, and was heavily defeated at the general election of 1905. In 1910 he organised for the newly-appointed Premier, Lukacs—leader of a coalition that failed to obtain confidence of the Chamber—a new party called the National Party of Work, which secured a large majority at the general election in June. Obstruction becoming dominant, T. had himself elected President of the Chamber in 1912, and in many stormy sittings forced the Army Bill through. One of the deputies fired at him three times as he sat in the chair, June 7. He fought several duels with opponents, including Count Michael Karolyi. On June 15, 1913, T. again became Premier. His policy has been a subject of conflicting judgments. He was supposed to be chief draughtsman of the ultimatum to Serbia, and Western peoples always regarded him as peculiarly irreconcilable. It is now asserted that he really tried to avert the War. But he was adamant in his attitude to minority peoples within the territories of the Dual Monarchy, so that he hopelessly estranged Rumanian feeling. On the death of the Emperor Francis-Joseph, 1916, T.'s influence began to wane. The Emperor Charles favoured a thorough review of the problem of the Slav pops, and also a democratisation of the franchise. T. objected to both these reforms, resigned May 1917, and went into active service as a colonel. He served with distinction in the Bukovina and in Italy. He also went on a mission to Croatia and Bos-

nia, 1918. In Oct. 1918 he was back in Budapest, convinced that the War was lost. He was trying to unite parties for the purpose of securing a favourable peace, but it seems that his activity was misunderstood. He was shot at by returned soldiers, and killed, in a street in Budapest, Oct. 31. On his policy, especially during the closing months of his life, consult Glaise von Horstenau, *Collapse of Austria-Hungary*, 1930.

Tit, or Titmouse, names given to members of the passerine family Paridae. Five species, all great insect-eaters, are common in Britain, and two occur in a few districts: one of these is the bearded T. or reed pheasant (*Panurus biarmicus*), which is found only in Norfolk and Yorkshire; the male is about 6 in. long, and has a thin tuft of black feathers on each side of the chin; the general colour is light red. The crested T. (*Parus cristatus*) occurs only in parts of Scotland, though it sometimes visits England. The blue T. (*P. caeruleus*) is the commonest of these birds; its prevailing colour is blue, with green above, and a black throat. The cole T. (*P. ater*) has a black head, with a white patch on the nape. The great T. (*P. major*) is about 6 in. long and is yellow on the back, breast, and sides, with grey wings and tail, and black head and throat. The marsh T. (*P. palustris*) resembles the cole T. except for the latter's white nape and white spots on the wings. The long-tailed T. (*Acredula caudata*) is about 5½ in. long, and has the black tail feathers prolonged and graduated.

Titania, see MAB, QUEEN.

'Titanic' Disaster was caused by the White Star liner *Titanic* colliding with an iceberg on the night of April 14, 1912. In all, close on 1500 persons were drowned, among the more well known being Colonel J. J. Astor, Jacques Futrelle, the American novelist and dramatist, F. D. Millet, the artist, William T. Stead, and Harry Widener, millionaire book-collector. Out of 2201 passengers, only 711 were saved. The *T.*, which was then the largest vessel afloat (tonnage about 45,000), was on its maiden voyage to New York, and shortly before midnight of the third day of the trip, when in lat. 41° 26' N., and long. 50° 14' W., struck an enormous iceberg a glancing blow, stripping off her bilge practically from end to end. Such life-boats as were on board were lowered in a calm sea and wholly or partly filled with passengers, the majority being women. Less than three hours from the impact the liner sank. The 711 survivors were picked up some hours later by

the *Carpathia*, with whom the *T.* had got into wireless communication. Consult Commodore Sir A. Rostrom, *Home from the Sea*, 1931.

The Mersey Report of the Royal Commission appointed by the British Gov. found that (1) the ship was travelling at an excessive speed; (2) the captain was not negligent, but extra look-outs for ice should have been kept; (3) the life-boat accommodation was altogether inadequate; although the *T.* complied with the regulations, then existing, of the Board of Trade and the provisions of the Merchant Shipping Act (*q.v.*) for the safety of passenger steamers; and (4) another steamer saw the lights of the *T.* and could have pushed her way through the ice and rescued most of those left on board.

Titanium, a metallic chemical element, symbol Ti, atomic weight 47.9, atomic number 22. It occurs in nature as the oxide which exists as the polymorphic varieties, anatase, rutile, and brookite. The metal is white and lustrous (sp. gr. 4.5), and is obtained by the electrolysis of a solution of the oxide in calcium chloride, or, better, by heating titanium tetrachloride with metallic sodium in the absence of air. T. unites directly with nitrogen to form a nitride having a metallic lustre. Like silicon dioxide, T. dioxide is the anhydride of a weak acid, but it also exhibits feebly basic properties. In its halogen compounds T. is quadrivalent and sexavalent. Though T. is a comparatively abundant element, few uses have been discovered for it or its compounds. T. is employed in the manufacture of various alloys; T. tetrachloride is used in making smoke-screens for naval purposes, and other compounds are used as pigments, chemical reagents, etc.

Titans, the sons and daughters of Uranus (Heaven) and Gæa (Earth). They were twelve in number, six sons and six daughters. It is said that Uranus, the first ruler of the world, threw his sons into Tartarus. Gæa, indignant at this, persuaded the Titans to rise against their father. The Titans then deposed Uranus, liberated their brothers who had been cast into Tartarus, and raised Cronus to the throne. It having been foretold to him by Gæa and Uranus that he should be dethroned by one of his own children, he swallowed his children successively. Rhea, therefore, went to Crete, and gave birth to Zeus in the Dictæan Cave. When Zeus had grown up he availed himself of the assistance of Thetis, who gave to Cronus a potion which caused him to bring up the children he had swallowed. United with his

brothers and sisters, Zeus now began the contest against Cronus and the ruling Titans. This contest lasted ten years, till at length Gæa promised victory to Zeus if he would deliver the Cyclopes and Hecatoncheires from Tartarus. Zeus accordingly slew Campe, who guarded the Cyclopes, and the latter furnished him with thunder and lightning. The Titans were then overcome, and hurled down into a cavity below Tartarus.

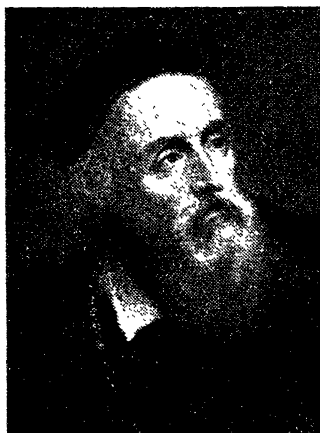
Titchener, Edward Bradford (1867-1927), experimental psychologist, was b. Chichester, England, Jan. 11. Graduating from Oxford University, he then went to Leipzig University for his Ph.D. degree, going there especially because that seat of learning had opened the first and still in those days the chief laboratory for experimental psychology. He graduated in 1892, and was at once called to Cornell University in the U.S.A., where one of the first experimental psychological laboratories in America had been founded. He remained there for the rest of his life, and became one of the recognised world authorities on his subject. His big four-volume work *Experimental Psychology* is the masterpiece on the subject so far as Eng.-reading people are concerned. In this exhaustive treatise he considered both qualitative and quantitative experimental work.

Tithe. Ts. were 'the tenth part of the increase yearly arising from the profits of lands, stocks upon lands, and the industry of the parishioners, payable for the maintenance of the parish priest, by everyone who has things titheable, if he cannot show a special exemption' (Thomas Wood's *Institute of the Laws of England*). Ts. were payable before the Christian era (see Gen. xiv. 20), but in the Christian Church Ts. were first given by the faithful as spontaneous offerings, at the solicitations of the clergy (Clarke's *Hist. of Tithes*). Such voluntary offerings were given in kind, most giving wool, corn, or other agricultural or farm produce. Canon law (q.v.) later enjoined payment as a legal obligation in accordance with the divine law of the O.T. (see TEINDS). Ts. were either *prædial*, *personal*, or *mixed*: *prædial* being the produce of the soil (e.g. corn, wood); *personal*, the produce of labour and industry; and *mixed*, the produce of animals, including eggs (Eagle, *On Tithes*). Prior to the decrees of the Lateran Council (1215), it was a common practice to pay T. to monasteries, but the Council restricted tithe-payers to payment to the parsons of parishes (Clarke). Hence most Ts. belonged as of common right to the parish incumbents,

though sometimes laymen could show a right to a portion of Ts., based upon a prior voluntary grant to some spiritual corporation. Again, rectorial Ts., after the dissolution of the monasteries, frequently found their way into lay hands (see IMPROPRIATION). The only lands exempt from Ts. were barren heath, waste forest or glebe, old monastic lands held prior to the dissolution exempt from Ts., crown lands or lands held by a spiritual corporation which has never been known to pay Ts., and lands in respect of which a modus or composition real was payable (Millard's *Tithe Rentcharge*). (A modus was an agreement between parson ordinary and landowners and patron, whereby the landowners agreed to pay a perpetual sum in lieu of T.) The Tithe Commutation Act, 1836, and amending Acts commuted all the Ts. of England and Wales into T. rentcharge and fixed the total amount of the rentcharge for which the Ts. of each parish were to be commuted. The law relating to T. is to be found in the Tithe Acts, 1836 to 1918, and in the Tithe Act, 1925, which latter Act expressly excludes the Extraordinary Tithe Redemption Act, 1886, from the collective title, 'The Tithe Acts, 1836 to 1918,' save where the context otherwise requires. These Acts provide the machinery for commutation, and also contain provisions as to a few matters which are still of some practical importance: these provisions relate to the redemption of T. rentcharge, procedure for recovery of T. rentcharge, the merger of lay T. rentcharge, the sale of barns and buildings formerly used for the housing of Ts. in kind, and their sites, and the powers of T. Commissioners, who are now merged in the Ministry of Agriculture. Provision is made by the Tithe Act, 1918, for the compulsory redemption, through the Ministry of Agriculture, of rentcharges exceeding twenty shillings, the consideration money for redemption being the amount agreed between the owners of the land and of the rentcharge or, failing agreement, the amount determined by the Ministry. If the consideration money be not paid within one month, the Ministry has power to make an order charging the land with payment. Provision for the apportionment of annuities created by the redemption of T. rentcharge is made by an Act passed in 1921. The Tithe Act, 1925, still further amends the law on T. rentcharge and other rentcharges, rents, etc., in lieu of T., and the payment of rates on rentcharge, etc. By this new Act any T. rentcharge which before March 31, 1927, was attached to a benefice or to

an ecclesiastical corporation was transferred to be vested in the Governors of Queen Anne's Bounty and held in trust for the incumbent or corporation; and the statutory machinery for the regulation of the administration of these trusts is provided by a measure passed by the National Assembly of the Church of England in 1928.

Tithing: (1) In Anglo-Saxon police arrangements, associations of ten men (in the N. of England called the *ten-mannetale*: elsewhere *frithborh* or *frankpledge*) who, dwelling near each other, were sureties or free pledges to the king for each other's good behaviour. The name and division of T. itself still remains in parts of the country. (2) Levying a tax on or to the amount of a tenth. See **TITHE**.



TITIAN

Tithonus (*Τιθωνός*), in Gk. mythology, was the son of Laomedon and brother of Priam. He was beloved on account of his beauty by Eos, who besought Zeus to bestow upon him immortality. This was granted, but as Eos forgot to ask for perpetual youth he became a hideous old man. As he could not die Eos changed him into a grasshopper.

Titian, or **Tiziano Vecelli** (c. 1477-1576), the greatest painter of the Venetian school, b. at Pieve, in Cadore, a mountainous dist. of the Venetian Alps. Having shown a taste for art, he was sent to Venice to learn painting, and first studied under Zuccati, a mosaicist, afterwards becoming the pupil of Bellini and

Giorgione. He seems first to have been employed in the decoration of houses, but he also produced works on canvas, notably the allegorical picture 'Sacred and Profane Love,' 'Doge Marcello' (at the Vatican), and 'Christ and the Pharisee—Tribute Money,' of the Dresden Gallery, spoken of by Vasari as something stupendous and miraculous. In 1516 he went to Ferrara, and executed amongst others the 'Bacchus and Ariadne,' now in the National Gallery. In 1533 he became acquainted with the Emperor Charles V., who sat to T. for his portrait, rewarding him by making him a Count Palatine and a Knight of the Golden Spur. Returning from Bologna to Venice (1537), he executed his magnificent 'Battle of Cadore,' which unfortunately perished by fire in 1577, but he was again with the emperor at Milan in 1541, and in 1545 accepted the pope's invitation to Rome, where he painted portraits, as well as 'Danaë,' now in the Naples Museum. In 1548 he undertook a journey across the Alps to join Charles V. at Augsburg, and painted the well-known portraits of Philip of Spain. From this time he was chiefly occupied in working at Venice, until in 1576 he died of the plague. T.'s works are remarkable for their magnificent colouring and technical skill. He painted religious pictures as well as mythological, poetical, and allegorical subjects, and as a portrait painter he occupies the first rank. Among his numerous works are: 'Holy Family and St. Catherine,' 'Noli Me Tangere,' 'Venus and Adonis' (all of which are in the National Gallery), 'Jupiter and Antiope' (Louvre), 'Alphonso of Ferrara and Laura Dianti' (Louvre), the Pesaro altar-piece (at Antwerp), 'The Three Ages,' 'Titian and his Mistress,' 'The Repose in Egypt,' 'Martyrdom of St. Lawrence,' 'St. Peter Martyr' (1530, destroyed by fire at Venice, 1567), 'Assumption of the Madonna,' and 'Entombment of Christ' (Louvre). See C. Phillips, *Titian: a Study of his Life and Work*, 1898; C. Ricketts, *Titian*, 1910; von Hadeln, *The Drawings of Titian*, 1927; R. F. Heath, *Titian*, 1930.

Titicaca, Lake, a mountain lake in the Andes, on the frontier of Bolivia and Peru, in S. America. It is 120 m. long, and lies 12,545 ft. above the sea. Its area is 3200 sq. m., and its maximum depth is about 700 ft. The water is fresh but unpleasant.

Tit-lark, see **PIPET**.

Title Deeds, deeds that establish a person's right or title to lands. The possession of the T. D. relating to any particular piece of land is of the first

importance, since no one can validly sell or mortgage the land who has not got the deeds, though he may well mortgage the equity of redemption.

Titles, the additions to a person's name, indicative of some honour, office, or dignity, *e.g.* emperor, prince, chancellor, primate, duke, mayor. Some *T.* are held *virtute officii*, as for instance 'king'; others, like the *T.* of the five orders of nobility in Britain, are hereditary, and some, like that of knight, are conferred for life.

Titmouse, *see* **TIT**.

Titration, a method in quantitative chemical analysis. The weight of a substance in a definite quantity of solution is determined by causing it to react with a solution of another reagent of known strength. This reagent is contained in a burette and run out into the other solution till reaction is complete, as shown by change of colour of an indicator such as litmus, methyl-orange, phenolphthalein, or by cessation of effervescence, etc. The quantity used is noted and the weight of reagent contained is thus known. From the chemical equation and the atomic weights, the amount of the other salt can then be calculated. *T.* methods are quick and, under suitable conditions, are susceptible of great accuracy; they have therefore largely displaced the older gravimetric methods, though these are still employed when even greater accuracy is required. *T.* was introduced by Gay-Lussac (*q.v.*) early in the nineteenth century.

Tittoni, Tommaso (1846-1931), *It.* statesman; *b.* in Rome, son of Vincenzo *T.* He was educated at Oxford and, after returning to Italy, he was, in 1898, appointed Prefect of Naples, and, later, President of the Provincial Council of Rome. In 1903 he was Foreign Minister in Giolitti's Cabinet, thereby improving the gov.'s relations with Rom. Liberals. He concluded an arbitration convention with Great Britain and, in 1904, an agreement for co-operation with Great Britain in the campaign against the Mad Mullah. He followed the policy of his predecessor, Prinetti, in fostering a good understanding with France. He then became ambassador in London, but, on the fall of the Sonnino Gov., in 1906 returned to the Consulta, where he devoted himself to cementing the Triple Alliance (*q.v.*) by improving *It.* relations with Austria. In 1910 he was ambassador in Paris, where his tact did much to avoid a threatened rupture over incidents in N. Africa arising out of the Italo-Turkish War. He resigned in 1911. In 1919, he was again Foreign Minister in Nitti's Cabinet, and took a

prominent part in the preparation of the Trianon and St. Germain treaties, but resigned through ill-health and also because he disagreed with Nitti over the Adriatic Question (*q.v.*). Up to the end of 1928 he was President of the Senate, and did much to maintain the prestige of that body in the transition days of Fascism. The change of front from Liberal to Fascist, in which he was unique among *It.* Liberal statesmen, lost him many friends, but gained for him the commendation of Mussolini. He was the first president of the recently founded *It.* Academy, but resigned through ill-health and was succeeded by Marconi. He edited *German Diplomatic Documents*, 1925; and *English Diplomatic Documents*, 1928; and pub. *Questioni di Giorno*, with a preface by Mussolini.

Titus, a friend and companion of St. Paul, not named in the Acts. All we know of him is learned from the letters of the Apostle. He was left by the latter as Bishop of Crete, and there he received the epistle which bears his name. Eusebius says that he remained unmarried and *d.* in old age.

Titus (*T. Flavius Sabinus Vespasianus*) (A.D. 40-81), a Rom. Emperor, son of Vespasian. He won distinction early as military tribune in Britain and Germany, and helped to crush a Jewish insurrection (67), besieging and storming Jerusalem (69-70). *T.* was associated with Vespasian in the gov. (71), and succeeded him (79), proving a wise and kind ruler. *See* Suetonius, *Titus*; Tacitus, *Hist.*; Josephus, *Hist. of the Jewish War*; Beulé, *Titus et sa Dynastie*, 1872.

Titusville, a city of Crawford co., Pennsylvania, U.S.A. It is the centre of the oil interest, and has iron and engine works. Pop. (1930) 8055.

Tityus (Τῑτύς), a giant of Eubœa, son of Gæa, or of Zeus and Elara. For offering violence to Artemis (or in other accounts to Leto) he was killed by Zeus or Apollo and then cast into Tartarus, where two vultures perpetually devoured his liver as he lay outstretched on the ground.

Tiumen, or Tyumen, a tn. in the prov. of the same name, in the Ural Area, Asiatic Russia, 125 m. S.W. of Tobolsk. It manufs. carpets and has tanneries, and is an important trading centre. Pop. 50,160.

Tiverton, a municipal bor. of Devonshire, England, on the Exe, 13 m. N.N.E. of Exeter. The chief building of interest is the old church of St. Peter. Lace-making is the chief industry. Blundell's School was originally built in *T.* in 1604; the present buildings were erected outside the town in 1882. Pop. (1931) 9600.

Tivoli (ancient *Tibur*), an ancient tn. 25 m. by railway E.N.E. of Rome, on the Teverone (ancient *Anio*), in Italy. Before Rome was built the Latin city of Tibur flourished. In Horace's day it was the favourite summer resort of wealthy Romans, and ruins of Hadrian's and Mæcenas' villas, besides mausolea, aqueducts, and a circular temple, are still shown. Apart from classical remains, the Renaissance garden of the Villa d'Este (begun in 1549) excites much interest. Beautiful falls on the riv. supply Rome with electric power. Pop. 16,000.

Tlaxcala, an inland state of Mexico and its capital. The state, which has an area of 1534 sq. m., lies on the Mexican plateau, average height 7000 ft., rising in Malinche to 13,454 ft. In the days of the great Aztec empire, T. maintained a sturdy independence within her mountain fastnesses till, in 1519, she became the ally of the Spaniards under Cortés. The capital lies 18 m. N. of Puebla. Pop. state, 178,570; tn. 2100.

Tlemcen, a tn. in the dept. of Oran, Algeria. The Rom. *Pomaria*, it was later the Moorish cap. It fell to the Fr. in 1842. It has synagogues, mosques, and a museum of antiquities. It exports blankets, olive oil, and alfa, and manufs. leather work and native carpets. Rashgun is its port. Pop. (1926) 26,758.

Toad, the name usually applied to members of the genus *Bufo* and of the family Bufonidæ. They differ from frogs chiefly by the total absence of teeth, and in certain anatomical features, such as the shoulder girdle and the sacral vertebra. In British Ts. a large poison-secreting gland, called the *paratoid*, occurs, but this is absent from the frogs. It appears to be necessary for the poison to come into contact with the blood through an abrasion or other means to be noxious. The two British Ts. are the natterjack (*Bufo calamita*) and the common T. (*Bufo vulgaris*), which is generally distributed over Great Britain, though absent from Ireland. It has longer hind limbs than the other and is able to hop. Its eyes are more lateral and the irises reddish-copper colour. The females are usually larger than the males. The natterjack, which is local in England, cannot hop, as the hind limbs are too short, but it is able to run and is often called the running T. Its eyes are more prominent and the irises greenish-yellow. During the breeding season the males croak very loudly. The value of Ts. to the farmer and gardener cannot be exaggerated, as they feed entirely on insects, millipedes, woodlice, slugs, and snails.

Toadflax, or *Linaria*, a genus of

plants and sub-shrubs (order Scrophulariaceæ), with a spurred corolla. A number of species grow wild in Britain, but some of them are not indigenous, including the ivy-leaved T. (*L. cymbalaria*), a widely distributed wall and rock plant, which reproduces itself readily from seed and by means of its long rooting stems. The yellow T. (*L. vulgaris*) is a handsome and common hedgerow plant, with terminal racemes and large yellow flowers. Several species are grown in gardens.

Toadstool, see FUNGI.

Tobacco. The use of T. dates from remote antiquity among the natives of the American continent. It was smoked in pipes and as cigars, and the Aztecs used nostril tubes for inhaling the smoke. The date of the introduction of T. into Europe has been fixed as 1559, Hernandez de Toledo having imported Mexican plants to Spain. Sir John Hawkins in 1565 first introduced it into England, and though Sir Walter Raleigh and Sir Francis Drake did much to popularise its use twenty years later, there is good evidence that T. was being extensively smoked about 1573. T. smoking met with vigorous opposition, in which King James I. joined, and smokers were persecuted, smoking being declared a capital offence in some countries, while in the canton of Bern its prohibition was included in the Ten Commandments. Its revival was due to its reputation as a disinfectant and its employment as a remedy for various maladies. By the beginning of the eighteenth century, its consumption was heavy, women and children being encouraged to smoke. The use of snuff displaced the practice of smoking in the Georgian period, but it returned to favour with the reduction of taxation on T. The cigarette habit began with the return of the soldiers from the Crimea. The popularity of smoking in Britain may be inferred from the fact that the total receipts from customs duties on T. in the past few years have ranged from £51,000,000 to nearly £60,000,000. Though smoking by women is customary in some of the Eastern countries, it was looked upon with disfavour elsewhere until after the Great War, when cigarette-smoking obtained a limited vogue among women. Smoking by children and the sale of T. to them is forbidden in many states, including Britain. The chief T.-growing districts are N.W. Cuba, the states of Kentucky, Carolina, Ohio, and Virginia, but T. culture is an important industry in Turkey, Mexico, and most parts of the British Empire (see *infra*) as well

as to an increasing extent in Europe. It was grown in Britain in considerable quantities in the seventeenth century, but its cultivation was prohibited under the Protectorate and in Charles II.'s reign, chiefly to foster the American industry. In 1799 T. growing was again permitted in Ireland, and by 1829 500 acres were under cultivation, chiefly in Wexford, but two years afterwards was again forbidden. The crop was revived in 1898, and in 1904 the cultivation of 100 acres was authorised with the rebate of 1s. per pound, afterwards reduced to 2d. Nicotine, the characteristic alkaloid of T., of high value as an insecticide, is prepared from inferior T. seedlings are planted out in May. The plants are topped and buds and shoots removed, so that each bears about a dozen large leaves. These are harvested in September, and are dried in specially constructed barns in a temperature of about 75°. Afterwards they are sweated in covered heaps for from six to eight weeks and are then fermented and dried. T. was formerly much adulterated with a large variety of substances, but the strict supervision now makes this almost impossible.

British Empire Tobacco Production.—T. produced in the Empire was accorded in Sept. 1919 a preference of a rebate of $\frac{1}{2}$ of the full rate of import duty. At that time this represented an advantage of 1s. 4 $\frac{1}{2}$ d. per lb. In July 1925, the rebate was increased to 50 per cent. to $\frac{1}{2}$ of the full rate, or to 2s. 0 $\frac{1}{2}$ d. a lb., and by the Finance Act of the following year the preference was stabilised at this figure for ten years from July 1, 1926. This preference represents more than the value of the leaf itself in recent years. The effect of the preference in Rhodesia and Nyasaland has been direct. In S. Africa the expansion in production has been assisted by causes of a more local character, where a revision of the fiscal and co-operative laws undoubtedly stimulated tobacco cultivation. In Canada the local market for the leaf has expanded slowly. In Cyprus the production multiplied twenty-three times in the six years ending 1926. In Australia the expansion has not yet sufficed to meet the local demand. The increase from 1918 to 1926 in production in the Empire countries showing special development is:

	Increase in 1000's of lb.
Southern Rhodesia	. 18,555
Northern Rhodesia	. 1,626
Nyasaland	. 8,384
Canada	. 14,591
Union of S. Africa	. 4,069

The magnitude of the United Kingdom manufactures and the greater use of Empire tobacco is shown by the withdrawal of 161,885,000 lb. of tobacco from bond by British manufacturers in 1919 and in 1927 of 166,980,000 lb. Of these totals 1,546,000 lb. were of Empire growth in 1919 and 22,793,000 in 1927. See Report of the Imperial Economic Committee, Cmd. 3168, 1928.

Tobacco in the U.S.A.—T., which was indigenous to the American continent, is grown in nineteen of the forty-eight states of the U.S.A., and constitutes one of the most important agricultural crops. Kentucky is peculiarly the home of burley T., a strong leaf which is used largely in the making of plug tobacco for chewing purposes and for pipe-smoking. The bulk of the T. used for cigarettes is grown in North Carolina and Virginia. In 1929 2,015,000 acs. were devoted to T.-growing in the U.S.A. The crop was 1,500,891,000 lb. and the value was \$285,583,000. The revenue collected in the form of a Federal gov. tax on manufactured T., including chewing and pipe tobacco, cigars, cigarettes and snuff, was \$450,339,000 in 1930. The consumption in the U.S.A. was 6,730,660,719 cigars, 119,944,475,002 cigarettes, 333,845,754 lb. of chewing and smoking tobacco and 41,900,537 lb. of snuff. In 1928 in N. Carolina the crop was 475,230,000 lb. worth \$87,918,000, and in Kentucky the crop was 306,000,000 lb. worth \$58,550,000.

Tobacco Poisoning is due to long-continued over-indulgence, and affects not only the heart and nervous system, but also the digestion. The best treatment is a general tonic, and an entire abstinence from T. for some weeks, when the symptoms will usually all disappear. Excessive smoking almost invariably undermines the constitution sooner or later.

The analysis of T. shows its ingredients to be: (1) A tobacco camphor called nicotianin, which crystallises and is solid at the ordinary temperature of the air; (2) nicotine, an alkaloid which, like conia, does not exist in ordinary temperatures in a solid form, but in a fluid and volatile state having an oily appearance.

The empyreumatic oil of T. appears to be formed during the destructive combustion, and does not exist naturally in the leaf, but is probably formed at the expense of the nicotina. It does not therefore exist in the infusion of T., the mode of action of which differs in several respects from the other forms in which it is employed. The products of T. when burnt, as in smoking, are carbonate of ammonia, nicotianin, empyreu-

matic oil, soot, and some gases. See F. W. Fairholt, *Tobacco, its History and Associations*, 1875; J. B. Killibrew and H. Myrick, *Tobacco*, 1910; A. Machen, *The Anatomy of Tobacco*, 1926.

Tobago, an island of the British W. Indies, 22 m. N.E. of Trinidad. The chief products are sugar, cotton, tobacco, cocoa, and rubber. It was discovered in 1498 and became the property of Britain in 1763. Chief tn., Scarborough. Area 114 sq. m. Pop. about 26,000.

Tobit, Book of, one of the books of the Apocrypha, which, however, is included in the Vulgate. It is a Haggadic romance based on an old tradition, embodying in historical form a series of moral and religious lessons. Its date is given by Ewald as about 350 B.C., but Hitzig places it in the reign of Trajan.

Tobogganing (from an Indian word, *tobaakan*, meaning sledge), the practice of sliding down natural or artificial slopes of snow or ice on a sled having a curved-up front, and usually furnished with iron or steel runners. The American clipper-sled is about 13 in. wide and is fitted with round steel runners; the rider lies flat upon it, face downwards, and steers it with his toe. Two such sleds fastened together form a bob-sleigh or 'double-runner'; it is usually steered by turning the front runners by means of a wheel or ropes. The course from Klosters to Davos is nearly 2 m. long and has a drop of 800 ft.; on it are contested the International and Symond's Cup races.

Tobol, a trib. (425 m. long) of the Russian Irtysh, which it joins near Tobolsk. It rises in the S. Urals.

Tobolsk, a former gov. and its cap. in Western Siberia: (1) The gov., which had an area of 535,739 sq. m., stretched from Semipalatinsk in the S. to the Arctic Ocean in the N., and roughly corresponded with the present Ural Area of Soviet Siberia. (2) The tn. is a well-built city on the Irtysh, near its junction with the Tobol, 305 m. E.N.E. of Sverdlovsk (Ekaterinburg). It was once the cap. of W. Siberia, and is a centre for trade between European Russia and Siberia. Here Nicholas II. was imprisoned after the revolution, and it was the scene of considerable strife in 1919. Pop. 18,268. See URAL AREA.

Tobruk, or Morsa-Tobruk, a port in the prov. of Cirenaica, Libya. It has an excellent harbour, and was occupied by Italy in 1912.

Tocantins, a riv. of Brazil, rising in the state of Goyaz and flowing N. into the Atlantic Ocean through the Rio Para. Its largest trib. is the Araguaia. Its course, which is much

interrupted by rapids, is navigable only in some parts. Length 1500 m.

Toccata, in music, an instrumental composition. It is intended to exhibit brilliance of touch and execution, as the name, from Italian *toccare*, to touch, indicates. A succession of notes of equal length give it a flowing movement, the whole having 'the air of a showy improvisation.'

Toc H, an organisation formed to bring together into Christian fellowship men of every class and opinion for the purpose of social service of all kinds. The name, Toc H, comes from the army signallers' designation of the initials, T. H., which stood for Talbot House. Talbot House was opened in Dec. 1915 at Poperinghe in Flanders as a chapel and club for soldiers. It was a memorial to Gilbert Talbot, who was killed in July 1915, and was founded by his brother, Neville Talbot, now Bishop of Pretoria, and the Rev. P. B. Clayton, widely known as 'Tubby.' In 1920 Clayton formed a small Toc H group in London, and in 1922 an auxiliary body, the League of Women Helpers, was organised on the same lines. In the same year Toc H was incorporated by Royal Charter. The movement, which unites all Christian denominations, has grown, and there are now (1932) over 1000 groups and branches throughout the world. The Patron of Toc H is the Prince of Wales, and each of the symbolic Lamps of Maintenance which are entrusted to every branch is first lighted by him. The Lamp is lit at every meeting of the branch in a short ceremony of remembrance and self-dedication. The war-time history of Toc H is dealt with in two books by Clayton, *Tales of Talbot House* (1919) and *Plain Tales from Flanders* (1929); its subsequent development and aims are described in current literature issued at headquarters (47 Francis Street, London, S.W.1). The *Toc H Journal* is published monthly.

Tocqueville, Charles Alexis Henri Maurice Clérét de (1805-59), a Fr. historian, accompanied Gustave de Beaumont to America to study prisons in 1831, and took the opportunity to collect materials for his *De la Démocratie en Amérique* (1835), a work of peculiar interest as the first reasoned and more or less unbiased exposition of popular gov. in that country. An orthodox Liberal in politics, he was elected vice-president of the Assembly in 1849, was disappointed when Louis Napoleon became emperor, and met with an enthusiastic reception from John Stuart Mill and other great Whigs when he visited England. He pub. *Ancien Régime et la Révolution*, 1856.

Todas, The, a pastoral tribe dwelling in isolated hamlets ('mand') on the slopes of the Nilgiri Hills, India.

Todhunter, Isaac (1820-84), an Eng. mathematician; graduate of London and Cambridge. At St. John's College he was a scholar, fellow, and lecturer in turn, heading the degree list as senior wrangler, and gaining the mathematical blue riband, Smith's Prize. He was a member of the council of the Royal Society. His text-books on algebra, trigonometry, and calculus were well known.

Todi (anct. *Tuder*), a city of Italy, in the prov. of Perugia, 24 m. S. of Perugia. There are remains from the time of the Romans and Etruscans, and a Renaissance church. Pop. 17,000.

Todi, Jacopone da, see JACOPONE DA TODI.

Todleben, Franz Eduard Ivanovich, Count (1818-84), Russian general and engineer, b. at Mittau in Courland. He entered the Russian army as an engineer in 1836; served against Schamyl in the Caucasus (1848); in the siege of Silistria (1853), and in the Crimean War, where he constructed the fortifications of Sebastopol (1855). In the Russo-Turkish War he successfully besieged Plevna (1877). See his work on *The Defence of Sebastopol*, 1864-72; also Brialmont's *Life*, in French, 1884.

Todmorden, a municipal bor. in the W. Riding of Yorkshire, England, 19 m. N.N.E. of Manchester. It has cotton weaving and spinning factories, foundries, and machine shops. Pop. (1931) 22,223.

Toga, the principal outer garment of the anct. Romans, made of woollen material, usually white. It was a large semicircular piece of cloth, the straight side 4 or 5 yds. long, the largest width about 2 yds. It was worn with half the straight side hanging over the left shoulder in front, the other half brought round under the right and over the left shoulder. The 'toga prætexta,' worn by children, magistrates, and priests, had a purple border. At the age of seventeen the youth assumed the 'toga virilis.' The 'toga picta' (embroidered) was worn by generals in their triumph. The emperors wore a purple toga. Mourners and persons impeached wore a 'toga pulla' of a dark colour, while those seeking office wore a white one, whence the name 'candidati.' The garment was not allowed to be worn by foreigners or slaves.

Toggenburg, the upper valley of the R. Thur, canton of St. Gall, Switzerland. It extends for about 30 m. The chief villages are Lichtensteig, Kirchberg, and Wattwil.

Togo, Heihachiro, Count (b. 1847),

Japanese admiral and member of the Supreme Military and Naval Council, b. in Kagoshima. Studied in England at the Thames Naval College, Greenwich, and on the *Worcester*. 1871-73. He had already entered the Japanese navy and seen some service. Made admiral, 1904; acted during Russo-Japanese War as commander-in-chief of the Combined Fleet. His exploits during this war were numerous, the chief being the bombardment of Port Arthur. Count, 1907. Present at the coronation of George V. Admiral of the Fleet, 1921.

Togoland, a W. African territory under the mandate of the League of Nations, was a Ger. colony from 1884 to 1914. In Aug. of that year it was surrendered unconditionally to the Eng. and Fr. forces. It is now divided between those two nations, 12,600 sq. m. in the W. being attached, for administrative and educational purposes, to the Gold Coast, and the remainder, 21,893 sq. m., including all the coast line, to the Fr. colony of Dahomey. Upper Volta bounds it on the N., the Gulf of Guinea on the S. A chain of highlands runs from S.W. to N.E., the highest point being Mt. Atiakuse (3248 ft.). The chief rvs. are the Volta, which formerly separated T. from the Gold Coast, its tributary the Oti, the Mono, and the Shio and Haho which empty into Togo Lagoon. The climate is unhealthy. Palm kernels, maize, rubber, palm-oil, copra, cocoa, kola nuts, and raw cotton are exported, and cocoa, tapioca, coffee, coconut and oil palms and bananas, etc., are cultivated on fertile tracts which lie between arid plains, whilst dye woods and caoutchouc grow in the forests. The dist. is rich in iron, which is smelted by the natives. Some cattle are reared. The capital and chief port Lome (9500 inhabitants) is connected by rail with Aneho, the second port, and Palime for Misahöhe, and Atakpame, all in Fr. territory. In British T., of which Yendi is the chief tn., there are no rlys. A trade school has been established at Yendi. Straw-plaiting, weaving, wood cutting, smith-work, and the making of earthenware are the chief industrial occupations of the coloured peoples, who, in the S., are of Bantu stock. They speak 30 different languages, of which Ewe is the chief. The inhabitants of the N. are of Hamitic descent and speak 16 languages. Pop. British T., 138,265; Fr. T., 742,728; total white pop. 545. See *Togoland Handbook* (H.M. Stationery Office), 1921; E. R. de Card, *Les Mandats français sur le Togoland et le Cameroun* 1924.

Tokat (anct. *Dazimon*), a tn. and vilayet of Turkey in Asia. The tn. is 52 m. N.N.W. of Sivas. It manufs. copper-ware and leather. Pop. (1927) 20,430.

Tokay, or **Tokaj**, a tn. of Zemplén co., Hungary, at the confluence of the Bodrog and the Theiss, 148 m. E.N.E. of Budapest. It is famous for the wine it gives its name to—*Tokay*. The vine grows on a plateau among the Hegyalja Mts. Pop. 5300.

Tokyo, or **Tokai** ('Eastern Capital'), the cap. of Japan, situated on the S.E. side of the island of Honshū or Honshū in the Bay of Tokyo, on the delta of the Sumida R., which separates the city proper on the W. from Honjo on the E. It was founded in the sixteenth century, and until 1868 was known as Jedo, Jeddo, or Yedo ('Estuary Gate'); it received its present name when the Mikado removed his court thither from Kyōtō. The tn. was open to the residence of foreigners in 1869. The magnificent palace, in Japanese-European style, stands in the park Fukiage, not far from the anct. castle. To the E. of the palace lies the commercial and industrial part of the city, while the northern division is mainly educational, containing the Imperial University, which had 7396 students and 636 professors in 1925-26, the Law School, First Higher Middle School, the military academy, arsenal and numerous beautiful temples. In the W. and S.W. are the foreign embassies and legations. Printing and publishing are important industries. The port of entry, Yokohama, is 17 m. distant. T. has suffered frequently from fire, so many of the houses being built of wood, as well as from storms, earthquakes, and epidemics. The gov. buildings had to be rebuilt after the fire of 1891. In Sept. 1923 great portions of the city were destroyed by a disastrous earthquake and a fire that followed after. Yokohama suffered even more severely. Nearly 70,000 people were killed in T., and the number that migrated after the disaster brought the decrease in pop. to nearly a million. Reconstruction work was begun at once and by Mar. 1930 was completed. The more important buildings were made both quake and fire proof; three large parks and 51 smaller ones were laid out to serve as refuges; and wherever possible improvements in the planning of the city were carried out. It is lit by electricity, and served by electric tramways. Pop. (1923) 2,478,250; (1925) 1,995,567.

Toland, John (1670-1722), an Irish man of letters, published in 1696 a work entitled *Christianity Not Mys-*

terious, which occasioned a controversy between the deists and the orthodox, and was in the following year, by order of the House of Commons, burnt by the common hangman. In 1701 he visited Hanover and Berlin, and four years later published a valuable *Account* of these courts, in which he gave interesting pen-portraits of the royalties. He wrote a life of Milton.

Toledo: (1) A prov. of the Tagus valley, Central Spain, 5919 sq. m. in area, formed (1833) from part of New Castile. It is bounded N. by Avila and Madrid, E. by Cuenca, S. by Ciudad Real, W. by Cáceres, and is mountainous except in the Tagus valley itself. Various minerals are found, but not much worked. Sheep, asses, goats, and fighting bulls are reared, bees and silkworms are also kept. Some textiles, earthenware, wine, spirit (aguardiente), oil, and chocolates are manufactured. Pop. (1928 est.) 476,867. (2) The cap. of above, on the Tagus, 50 m. S.S.W. of Madrid, and once cap. of all Spain. It has a fine Gothic cathedral (1227-1493), the seat of an archbishop, and interesting Moorish and Mudéjar remains. The great square or 'Zocodover' was once the scene of bull-fights and the burning of heretics. The fine old Alcazar was partially burnt in 1887. Toledan sword-blades were famous in Rom. times, and fine steel cutlery is still manufactured near by. Pop. 25,250. See Ibañez Marin, *Recuerdos de Toledo*, 1893; Calvert, *Toledo*, 1907; H. Lynch, *Toledo* (Med. Town Series); M. González Simancas, *Toledo*, 1929. (3) The co. tn. and port of entry of Lucas co., Ohio, U.S.A., on Maumee Bay, at the W. end of Lake Erie, about 92 m. from Cleveland. Manufs. include flour, motor vehicles, glass, bicycles, sugar, and electrical appliances. Its trade is carried on by means of the Great Lakes, canals, and numerous railways. It has a university. Pop. (1930) 290,718.

Tolentino (anct. *Tolentum Picenum*), a tn. of Macerata prov., Italy, 11 m. S.S.W. of Macerata. The cathedral and the church of San Catero are interesting. A treaty was signed at T. in 1797 between Napoleon and Pope Pius VI., and here in 1815 the Austrians defeated the Fr. under Murat. Pop. (com.) 14,000.

Toleration, the doctrine that a citizen may adopt or discard any religion without state interference. The Rom. Cath. Church rejects T. in theory, although circumstances have made T. universal in practice. On the other hand, religious T. is not a direct offspring of the Reformation, but rather of the humanitarian and liberal

movements which followed it. Largely, also, it is due to religious indifference.

Tolima, a dept. of Colombia. Area 10,080 sq. m. Cap. Ibagué (pop. 53,664). The volcano of Tolima rises 18,425 ft., the highest peak in Colombia. Pop. (1928) 532,621.

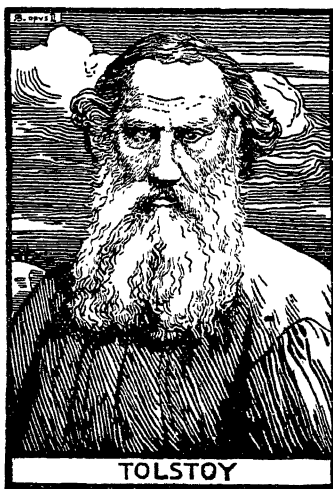
Toller, Ernst, Ger. poet and playwright; b. Dec. 1, 1893, at Samotschin, Bromberg dist.; son of a merchant. Educated: Realgymnasium, Bromberg; Grenoble; Heidelberg; Munich. Having fought in the Great War as a volunteer, and being a Socialist, he was prominent in the struggle for power in Bavaria, 1919, and suffered imprisonment. Plays include: *Die Wandlung*, 1920; *Masse-Mensch*, 1921, Eng. trans. *Masses and Man*, 1923; *Maschinenstürmer*, 1922, Eng. trans. *The Machine Wreckers*, 1923; *Hinkemann*, 1924; *Hoppla, wir leben!* 1927, Eng. trans. 1928. *Gedichte der Gefangenen*, 1921, and *Das Schwalbenbuch*, 1924 (Eng. trans. 1924), are vols. of verse.

Tolls, a tax imposed in consideration of some privilege. In the feudal system it meant the right to tollage one's villeins. Later it became the distinguishing mark of a turnpike road, i.e. a road having toll-gates or bars on it, called 'turns.' These 'turns' appear to have been first constructed about the middle of the eighteenth century, when certain interested individuals subscribed among themselves for the repair of various roads, and exacted a T. for the privilege of using the roads so repaired. The popular resistance to these exactions led to the passing of Acts to regulate T. These turnpike roads are now extinct. Where a claim to demand T. is made, there is a distinction between a *toll thorough* (through) and a *toll traverse* (across); the former being granted in consideration of the performance of a continuing beneficial service, such as the repair of a road or the maintenance of a bridge or ferry; the latter, if permitting the general public to pass over the land of the grantee of the toll. Carriages employed in the military service are exempt from payment. Other kinds of T. are *port-tolls*, or charges on goods carried into a port; *turn tolls*, or charges on cattle driven to market and returned unsold, and T. levied by railway companies, as a statutory authority, upon merchandise carried on their lines. See Pratt, *Law of Highways*.

Tolstoy, Alexeyei, Count (1817-75), Russian author; b. Aug. 24 (O.S.), at St. Petersburg; son of Count Konstantin Petrovich T. Brought up on an uncle's estate, Krasny Rog,

Tchernigov; inherited it later. Educated Moscow. In diplomatic service. Fought in Crimean War. Wrote one novel (of Ivan the Terrible's time), 1862. About same time appeared his dramatic poem *Don Juan*. Wrote a dramatic trilogy: *Death of Ivan the Terrible*, 1866; *Tsar Fiodor*, 1868; and *Tsar Boris*, 1870. Wrote lyrics. Died at Krasny Rog, Sept. 28 (O.S.).

Tolstoy, Count, Leo Nikolaivitch (1828-1910), a Russian novelist, poet, and social reformer, of noble family b. at Yasnaya Polyana in the gov. of Tula. Being left an orphan at the age of nine, he was brought up by an aunt, and with his brothers studied under a Fr. tutor until 1843, when he was sent to the University of Kazan. He did not distinguish himself scholastically, and



on leaving college gave himself up to pleasure for some years. In 1851 he joined the Russian artillery in the Caucasus, and on the outbreak of the Crimean War took command under Prince Gortchakov and fought at Silistria (1854), and at Sebastopol (1855). During these stirring times he wrote a series of brilliant war sketches entitled *Tales from Sebastopol* which made him famous. He had previously contributed to the Russian *Contemporary*, and had written *Childhood*; *The Landlord's Morning*; *Boyhood*; *Youth*; and *The Cossacks*. On his return to St. Petersburg after the war he was welcomed into the

garest social circles and the most exclusive literary cliques. He won the admiration of Turgeniev, but the respect they had for each other did not grow into anything warmer on account of their differences of opinion. T. freed the serfs on his estate and he was revolutionary in his educational schemes for the peasants, but, always individualistic, he stood outside the progressive Socialistic movement, then growing in Russia. In 1862 he married Sophia Behrs, and he now began his two great masterpieces, *War and Peace*, completed 1866, and *Anna Karenina*, completed 1877, and in 1880 he published his religious experiences in *My Confession*. His later works were written with a conscious didactic and mystical intention, and include *Ivan Ilyich*; *Kreutzer Sonata*; *The Kingdom of God is Within You*; and *What is Religion?* Later in life he gave himself up to studying and supplying the needs of the poor; he renounced his property in favour of his wife and children and endeavoured to introduce a peasant's manner of life into his own household. Estranged from his wife, he found his home embittered and left it secretly, dying ten days later, on Nov. 8, 1910, at Astapovo. His *Works* were translated into Eng. by N. H. Dole (19 vols. 1889-90); the Oxford Centenary Edition, being the authorized trans. by Aylmer Maude, was begun in 1928 and ten of the 21 vols. have been issued (1932). The Moscow Edition of all T.'s writings in the original in 99 vols. is in preparation. See *Lives* by Birukoff (1905, 1906), Aylmer Maude (1908, 1910, 1930), and R. Rolland (Eng. trans. 1911); Maxim Gorky, *Reminiscences of Tolstoy*, 1920; Aylmer Maude, *Family Views of Tolstoy*, 1926; Leo Tolstoy, Jr., *The Truth about my Father*, 1927; *Tolstoy's Love Letters*, trans. by Kotliansky and Virginia Woolf, 1923; *The Private Diary of Leo Tolstoy* (1853-57), trans. by L. and A. Maude, 1927; also J. Larrin, *Tolstoy: a psycho-critical study*, 1924; Aylmer Maude, *Tolstoy on Art*, 1925.

Tolstoy, Peter, Count (1645-1729), Russian statesman; son of Andrei Vasilevich T.; descended from Indris, a Ger. who established himself at Tchernigov in 1353. Employed by Peter the Great's mother; and named ambassador to Constantinople by Peter, 1702. The Turkish Gov., siding with Sweden, imprisoned T. four years in the Fortress of Seven Towers. On release, 1716, he was made senator, and employed by Peter to capture his rebellious son Alexey. T. persuaded Alexey to return from Naples to Russia, and

was party to the cruelties that resulted in the death of the prince in 1718. T. became privy councillor, president of the secret chancellery and count (May 7, 1723). Was deep in councils of Catherine I. Peter II. immured him in the monastery of Solovetsk, 1727: *he d. there*, Feb. 17.

Toltecs, a semi-legendary people of Mexico and Central America, to whom the Aztecs and Mayas ascribed many cities, monuments, and arts, whose certain origin was unknown. The legendary history of the great national hero, Quetzalcoatl (*d. A.D. 895*), is found in *Historia de Colhuacan y de Mexico*. See *Seler's Commentary* (Eng. trans. by A. H. Keane), 1901-02.

Tolu, see BALSAM.

Toluca, or Tolocaco, a tn. of Mexico, cap. of the state of Mexico, 45 m. S.W. of the city of Mexico. It is a summer resort and the centre of an agricultural and stock-farming region. The Nevado de Toluca, an extinct volcano (14,950 ft.), lies S.W. of the tn. Pop. (1921) 34,265.

Toluene, Methyl Benzene, or Phenyl-methane ($C_6H_5 \cdot CH_3$), a mobile liquid (boiling-point $110^\circ C.$) which resembles benzene in most respects. It is prepared from the 90 per cent. benzol obtained from coal-tar and is used in the preparation of dyes.

Toluidine. The Ts. or amido-toluenes ($C_6H_4(CH_3)NH_2$) are prepared from the corresponding ortho-, meta- and para-nitrotoluenes by reduction. Ortho- and meta- T. are oils boiling at 197° and $199^\circ C.$ respectively. Para-toluidine is crystalline, melts at 45° and boils at $198^\circ C.$ The Ts. resemble aniline in all their reactions and the ortho- and para-compounds are employed in the manufacture of dyes.

Tomahawk, the war-hatchet of the N. American Indians. Originally it was composed of a stone head tied to a wooden handle by leather thongs. One end of the stone was sharpened and the other hollowed into a pipe bowl, to which the hollow handle acted as stem. Subsequently steel and iron heads were introduced by Europeans.

Tomaszov, or Tomaszov Fabryeny, a tn. of Lodz co., Poland, 41 m. N.E. of Piotrkow, with manufs. of woollens, flour, and iron goods. Pop. 28,300.

Tomato, or *Lycopersicum esculentum*, an annual plant (order Solanaceæ), bearing globose red or yellow fruit, formerly known as 'love apples,' which within a few years came into immense popularity in Britain, its production, chiefly under glass, now being a large and important industry. Except in shel-

tered and especially favoured situations, and when the season is sunny, the culture of the fruit out of doors is unsatisfactory. The plants are raised from seed early in the year in warmth. They are confined to a single stem, shoots at the axils of the leaves being regularly pinched out. Liberal watering and manuring are necessary while the fruit is setting. Late fruit may be ripened in the dark in a temperature of 50° F.

Tomb (Gk. *τύμβος*), properly signifies a mass of masonry or stonework raised over a grave or vault used for interment; but it is applied, in a wider sense, to any sepulchral structure. Of primitive sepulchre there are two classes—one subterranean, the other of raised mounds or tumuli. Monuments of the first kind are numerous in Egypt; the Pyramids had no doubt a common origin with the tumulus. At some places in Etruria the Ts. are hewn out on the sides of rocks and hills, and their entrances present an architectural façade. Sepulchral edifices are numerous throughout Latium and Magna Græcia, many of which must have been remarkable on account of the architectural decoration bestowed on them. The Ts. of the Middle Ages are within buildings—churches, chantries, cloisters, etc.—and exhibit a variety of form and enrichment, from the primitive stone coffin to the lavishly decorated canopied monuments. Another class consists of *Altar* or *Table Tombs*. The next in order is the *Effigy Tomb*, first introduced in the thirteenth century, with a recumbent figure of the deceased upon it, extended, with the hands slightly raised and joined as if in the attitude of prayer. Altar and effigy Ts. were usually placed between the piers of an arch, or within a recess in a wall, and the whole T. was frequently covered by an arch forming a sort of canopy over it; of which kind is that of Aymer de Valence in Westminster Abbey.

Tombigbee, a riv. of U.S.A., rises in Prentiss co., Mississippi, and flows S. to unite with the Alabama R. to form the Mobile R. Length 500 m.

Tomi (later *Tomisvar*, or *Jegni Pangola*; modern *Kustendje*, or *Constantia*), a tn. of Thrace (later *Moesia*) on W. shore of the Euxine. It was once cap. of Scythia Minor, and is famous as the place to which Ovid was banished. T. was colonised from Miletus (c. 600 B.C.).

Tommaseo, Niccolo (1802-74), an It. writer and politician, b. at Sebenico, Dalmatia. Early in life he acquired an interest in public affairs, and attached himself to the Italian Liberal party, in 1848 becoming

Minister of Public Instruction. He was sent to Paris to seek the aid of France, and after the capitulation went first to Corfu and later to Tunis and Florence. It was at the first-named (Corfu) that he wrote his famous *Supplizio d'un Italiano*. He was a prolific and varied writer, amongst his most important publications being: *The Duke of Athens* (novel), *The Second Exile*, *Italy* (political writings), *A New Dictionary of Synonyms of the Italian Language*, etc. His *Letters* were edited by Verga (1904).

Tommasini, Vincenzo, It. composer, b. in Rome, Sept. 17, 1880. Studied (violin and composition) in Rome and later, under Max Bruch, in Germany. He is one of the most notable of the young It. composers. Among his operas are *Medea* (1906), *Uguale fortuna* (1913), *Le Donne di buon umore* (*The Good-Humoured Ladies*), a one-act comedy on motifs of Domenico Scarlatti written for Diaghilev's Russian Ballet, 1919. Also various orchestral works, among which are *Chiari di luna*, successfully performed at the Augusteo and elsewhere, and instrumental and chamber music.

Tompkins, Daniel D. (1774-1825), an American politician, was governor of his native state of New York from 1807-25, and rendered service to his country during the war with England in 1812 by making himself responsible for the efficiency of the N.Y. militia. Vice-President of U.S.A., 1817-25.

Tomsk: (1) A former gov. of W. Siberia, Russia, now included in the Siberian Region Proper of Asiatic U.S.S.R. (2) The former cap. of above, the largest city of Siberia. A branch line connects it with the great Siberian railway at Taiga, and there is steamer communication with Barnaul and Bijsk and up to the Urals. The university dates from 1888. The chief industry is tanning. Pop. (1926) 92,418. See **SIBERIA**.

Tom Thumb, see **DWARF**.

Tomtit, see **Trr**.

Ton, or **Tun**. **Ton** is now always used for the measure of *weight*. 1 T. = 20 hundredweight, therefore in Eng. 2240 lb.; but in the U.S.A. also (especially for goods sent by sea) 2000 lb. Hence the terms 'long' and 'short' T. See **TONNAGE**. The spelling **tun** is now restricted to the old measure of *capacity* from which the weight is probably derived, since a tun of water weighs approximately a ton.

Tonalite, a type of quartz diorite found in the Adamello Alps. Plagioclase quartz, hornblende, and biotite are dominant minerals, with magnetite, zircon, etc., as accessories. The granite-diorites of the U.S.A. are

of this type which is also found among the Scottish plutonic rocks.

Tonawanda, a tn. of New York, U.S.A., in Erie co., on the Erie Canal, with steel and iron and lumbering industries. Pop. (1930) 12,681.

Tonbridge, or **Tunbridge**, a tn. of Kent, England, on the Medway, 27 m. S.E. of London. Brewing and tanning are the chief industries. Tonbridge School was founded in 1553 by Sir Andrew Judd, but little of the sixteenth-century building remains. New additions were completed in 1894. The school has 490 boys. Pop. (1931) 16,332.

Tone, in music, is the interval of a major second. It is also used to indicate the quality of a sound.

Tone, Theobald Wolfe (1763-98), a United Irishman, was called to the Irish Bar in 1789, but devoted himself to politics, and printed articles attacking the gov. and agitating against it. He went to the U.S.A. in 1795, and in the following year to Paris, where he was active in efforts to promote an invasion of Ireland. He was given a command under Hoche, whose expedition did not effect a landing. He was captured in 1798 on a vessel in Hardy's squadron, and was tried by court-martial, and sentenced to death for treason. His *Autobiography* was published in 1893.

Tonga Islands, see FRIENDLY ISLANDS.

Tongaland, see AMATONGALAND.

Tongariro, volcanic mountains in the N. part of the North Island of New Zealand, Wellington prov., 20 m. S.S.W. of Lake Taupo. The northern plateau, to which the name is confined, has eight craters. To the S. is Ngauruhoe (7515 ft.), which was in eruption in March 1909. The Red Crater and Te Mariare also still active.

Tong-king, or **Tonquin**: (1) A Fr. possession of N.E. Indo-China, Asia (acquired 1884), forming with Laos (acquired 1892) one of the five Fr. dependencies in Indo-China. It is bounded N. by the Chinese provinces Kwang-tung, Kwang-si, and Yun-nan; W. by Laos; S. by Annam; E. by the Gulf of Tong-king. The Song-Koi or Red R. flows from N.W. to S.E. The mountainous, plateau, and forest land lies chiefly N. and W.; there is flat, low-lying, fertile land to the S.E. Area 40,530 sq. m. There are a number of small islands off the coast. Gold, silver (at Ngan-son), antimony, tin, and coal (at Hongai) are found, and there are rich limestone quarries and calamine mines. Teak, ebony, and sandalwood are the most valuable woods produced. Round the deltas of the Red R. and the Thajbinh rice is extensively grown; it forms the chief crop,

and in 1929 223,000 tons were exported, mostly to Hong-kong. In other parts are plantations of coffee, tobacco, maize, arrowroot, tea, ramie, cotton, jute, sugar-cane, and mulberry and some other fruits. Vegetables, betel-palms, areca-nuts, bamboos, hemp, indigo, gamboge, pepper, and cinnamon are also produced. A large quantity of rare silk is produced: some of it is exported, and the greater part is woven by the natives. The litchi (lichee or leechie) tree is a native of T. The chief imports are tools and machinery, beverages, yarn, and tissues, and the principal exports are rice, maize, and animal products. Haiphong is the chief port and Hanoi the cap. Pop. (1929) 129,600. Hanoi replaced Saigon as cap. of Fr. Indo-China (1902), and is connected by rail with Haiphong and with Vinh. It has various mills, foundries, distilleries, and breweries, and a school of medicine for natives (opened 1902). In 1917 the university of Indo-China was opened with ten faculties. T. formed part of the kingdom of Annam until the Fr. residency was created in 1884. In 1897 the King of Annam consented to Tong-king being run by the Fr. Resident-General. Pop. (1930) 7,402,000, of whom 9150 are Europeans. Consult Imbert, *Le Tonkin* . . ., 1885; Dupuis, *Le Tong-king*, 1898; De Lajonquière, *Ethnographie du Tong-king Septentrional*, 1906; Gaisman, *L'Œuvre de la France au Tong-king*, 1906; C. Madrolle, *Indo-Chine du Nord*; *Tonkin*, etc., 1925. See INDO-CHINA, FRENCH. (2) Gulf of, an arm of the China Sea, of average breadth 150 m., receiving the Song-Koi. It is bordered by T., Kwang-tung, and Hainan Island.

Tongue, a movable muscular organ attached to the floor of the mouth, and concerned in the operations of mastication, deglutition, speaking, and tasting. The T. consists of a mass of muscle symmetrically arranged about a middle line from tip to root. The base is attached to the hyoid bone; the upper surface, or dorsum, is free; the edges and the anterior portion of the lower surface are free. A fold of the investing mucous membrane is situated in the middle line of the under surface; this is the *frænum lingue*, or 'bride' of the T. The substance of the T. is striped muscle. It is supplied by branches of the lingual artery, whose origin is the external carotid. The nerves of the T. are the gustatory, for touch and taste sensations, the glossopharyngeal, supplying the posterior third, and the hypoglossal, which conveys motor stimuli. The surface of the T. is covered with squamous

epithelium and is supplied with numerous papillæ (see TASTE). The T. is liable to many morbid changes. By easily-recognised phenomena of furring, etc., the existence of disease of the alimentary canal is indicated. Acute inflammation is caused by wounds, and may lead to the formation of abscesses. Chronic inflammation is due to prolonged irritation, as by a broken tooth or excessive smoking. It may be followed by excessive growth of the surface cells leading to the formation of a cancer. Cancer of the T. is painful and dangerous, the only hopeful treatment being early removal by surgical operation.

Tonic, in medicine, an agent which tends to re-establish the proper performance of the functions of the body in general, or of some particular organ. Ts. differ from stimulants in that the latter produce a transient effect rapidly, while the former gradually build up a permanent effect. Among general Ts. are vegetable bitters, cold baths, exercise, etc.; iron and arsenic are blood Ts.; dilute acids are gastric Ts.; digitalis and strophanthus are cardiac Ts.

Tonic, in music, the fundamental key-note of a scale. See MUSIC.

Tonic Sol-fa, see SOLMISATION.

Tonk, chief tn. of the native state of Tonk, Rajputana, India, near the Banas R., 60 m. S. of Jaipur. Pop. 34,000. The state has an area of 2553 sq. m., including several detached regions. Pop. 287,898.

Tonka, or Tonquin, Bean, the seed of *Dipteryx odorata*, a leguminous tree or shrub, native of Guiana, bearing racemes of purple flowers followed by almond-like legumes. The beans are used in the manuf. of snuff, and are put amongst clothes to perfume them and to repel insects.

Tonkin, see TONG-KING.

Tonks, Henry, Eng. artist, b. Solihull, Warwickshire, 1862. Educated at Clifton and studied for the medical profession at London Hospital, becoming F.R.C.S. He abandoned medicine, however, and devoted himself to painting and the teaching of art. In 1917 he became Slade Professor of Fine Art in the University of London and he exercised a strong influence on the art of the Slade School. In 1930 he became Emeritus Professor. His paintings appeal more by colour than by form and he is especially successful in water colour. Works of his are exhibited in the Tate Gallery.

Tonnage of a ship is the measure of its cubical or carrying capacity expressed in tons. There are now in use four methods of expressing the T. of a ship, known respectively as the gross T., the net register T., the dead-

weight T., and displacement T. Before 1836 (1812 for warships) there was in use a much rougher and more inadequate measure, the 'builders' old measurement (B.O.M.), which, however, is still sometimes referred to. In calculating the gross T., the whole interior capacity of the ship below the T. deck is found, together with that of all covered-in spaces on deck used for stowage, and the result in cubic feet is divided by 100, a 'register' ton being a measurement of space calculated from the average bulk of light freight. The net register T. is the gross T. minus all those spaces used for the working parts of the ship or for the accommodation of crew or instruments. It is on this T. that dues are almost invariably paid. The dead-weight T. is the measure of the exact amount of cargo that a ship can carry without sinking too deep in the water. The displacement T. is that in use since 1872 for all ships of war throughout Europe. The amount of water displaced by a ship is, of course, equal in weight to the ship and all that it contains. Since 35 cub. ft. of water weigh one ton, the displacement T. is found by dividing by 35 the number of cubic feet of water displaced when the ship is immersed to its draught- or load-line.

Tonnage and Poundage. Tonnage, a tax of from 1s. 6d. to 3s. levied on each tun of wine or liquor imported into or exported from the United Kingdom, and poundage, a similar tax of 6d. to 1s. on every pound of dry goods, were first levied in 1371. James I. asserted his right to alter the rates of levy as he chose by means of additions called *Impositions*, and secured a decision in his favour on the legality of such additions against the merchant Bate. Parliament never ceased to protest against this denial of its claim to control taxation, and the resistance of Hampden to the collection of the tax precipitated the Civil War, after the close of which no further levy was ever made.

Tonnage Dues. Rates levied on the tonnage of ships entering ports or navigable public waters. Such rates are imposed by local Acts; and the mode of computing tonnage for the purposes of the dues may be that set out in the particular local Act, or may, with the consent of the Board of Trade, be on the registered tonnage as ascertained according to the rules made under the Merchant Shipping Act, 1894. By the constitution of the U.S.A. no state may impose T. D. without the consent of Congress; but a municipal corporation may levy a wharfage rate on the owners of unused steamboats mooring at a wharf.

Tonnerre, a tn. of France, in the dept. of Yonne, on the Armançon R., 27 m. S. of Troyes, famous for wine. Pop. 3900.

Tonquin, see TONG-KING.

Tönsberg, a fort. seaport, Jarlsberg-Laurvik amt, Norway, near the Christiania Fjord. It is one of the oldest tns. in Norway (A.D. 871), and is the headquarters of the sealing and whaling fleet. Near here are the ruins of an ancient fortress and royal residence. Pop. (1920) 12,568.

Tonsils, a pair of almond-shaped bodies situated in the fossa between the pillars of the fauces in the pharyngeal cavity. Each consists of a mass of lymphoid tissue plentifully supplied with blood vessels, and is covered with mucous membrane which dips into depressions called crypts. The T. secrete a viscous fluid which acts as a lubricant to the respiratory passages. Inflammation of the tonsils, *tonsillitis*, is caused by the introduction of septic organisms through the mouth, or by way of the blood. It usually commences with slight rigors, and the characteristic swelling soon makes its appearance. The swelling is accompanied by pain, and swallowing and even breathing may be rendered difficult. The temperature rises and usually a certain amount of suppuration takes place. A yellowish secretion appears on the surface of the T., which may be brushed away or removed by gargling. Hot poultices should be applied to the neck, and if suppuration has taken place the T. should be stabbed to release the pus. The inhaling of steam mixed with antiseptic vapours is useful in relieving the condition. In *chronic tonsillitis* there often occurs a permanent overgrowth of the substance of the T., which is best dealt with surgically.

Tonson, Jacob (c. 1656-1736), chief of the famous firm of publishers. He was apprenticed to a stationer and, having been admitted a freeman of the Stationers' Company in 1677, began business on his own account. T. purchased Dryden's *Troilus and Cressida* in 1679, and in 1681 acquired the valuable property of a half-share in the rights of *Paradise Lost*, of which he bought the other half in 1690. Afterwards he became associated as publisher with the principal men of letters of his day, including Steele, Pope, Addison, Congreve, and Wycherley. Jacob T. retired from the business about 1720.

Tonsure, the cutting of the hair in a certain form as a symbol of self-dedication to the monastic life. The custom first appears in the end of the fourth or beginning of the fifth century. In the anct. Celtic Church all

the front of the head was shaved in front of a line drawn from ear to ear. In the Oriental churches the whole head is shaved. In the Rom. Church the 'coronal of St. Peter' has always been used. In this T. the crown of the head is shaved to leave a fringe of hair all round.

Tooke, John Horne (1736-1812), an Eng. politician and philologist, took holy orders in 1760, but resigned his living in 1773. His Radical propaganda led to his being tried for high treason in 1794, but he was acquitted. He published in 1786 *The Diversions of Purley*, and was the author of many pamphlets. Biography by Alexander Stephens, 1813.

Toole, John Lawrence (1832-1906), an Eng. actor, went to the City of London School and later deserted a wine merchant's office for the stage. For him the years 1852 to 1896 were one perpetual round of acting, now in Edinburgh, now in London, where he played at the Adelphi (1858-67) and at his own theatre (1882-95), now in America, where he was a comparative failure (1874), later in Australia, where he was a complete success (1890), and finally in the provinces, where he made regular annual tours. Characterised often as 'the last great low comedian of the old school,' T. excelled, nevertheless, in serio-comic parts, like Michael Garner in Byron's *Dearer than Life*, Stephen Digges in the play of that name, an adaptation of *Le Père Goriot*, Caleb Plummer in *Dot—Boucicault's version of The Cricket on the Hearth*—and Dick Dolland in *Uncle Dick's Darling*. Other of his most brilliant rôles were Spriggins in Williams's farce, *Ici on parle français*, Tom Cranky in *The Birthplace of Rodgers*, and Paul Pry.

Tools, Machine. The most important machine for producing finished work with Ts. is the *lathe*. Since the invention of the *slide-rest* during the last century it has been possible to turn out very accurate work. The slide-rest affords a rigid support for the T. being used and can traverse it parallel to the piece that is being worked. The *screw-cutting lathe* has a slide-rest which is moved along at a uniform speed by gear wheels which are in turn connected to the object on which a screw is to be cut. Modern large lathes are used for big jobs such as turning guns and for finishing the treads and cranks of wheels and axles. On such lathes several Ts. are carried at once, performing different operations on various parts of the material. *Turret-lathes*, both hand worked, semi-automatic and automatic, play a large part in mass-production of articles. Turrets are usually

hexagonal and carry six Ts., thus permitting of six different operations on the object. Such lathes usually have a hollow headstock through which a continuous bar of metal is passed. As an example of their use, we may quote the manufacture of studs by which cylinder covers are held in place. First, the bar is moved through the headstock the right distance, then it is turned to size. The third and fourth operations screw-cut it at both ends and finally it is cut off. All these motions are performed entirely automatically by means of a trip action which engages with the requisite stops. The *planing machine* was invented by Clement about 1825. It is used for producing a truly level surface. In these machines the work moves under stationary Ts. on a rolling bed. If the work has only to be done in one direction, a quick return motion is employed, involving the use of two different-sized pulleys, or else the drive is performed electrically and an automatic reversing switch is employed. Owing to the great weight of certain objects which require planing, such as armour for battleships and the like, the energy for reversing the mass is much greater than that required for the actual cut, hence for such work the machines often have a fixed bed and movable Ts. But to-day planing is being largely superseded by *milling*, where a rod or disc has a serrated and sharp edge, shaped to the cut required. This milling-cutter is kept revolving at a high rate of speed and quickly removes the surface presented to it: whereas a planer can only remove at the outside limit a piece of material $\frac{1}{8}$ in. wide for each T., which seldom exceed four in number. Other Ts. which help to make the complicated mechanical productions of modern life are the drilling machine, the slotting machine, the shaping machine, and the boring machine. *Drilling machines* on certain occasions are of the multiple variety, i.e. several spindles are worked at once, if it is necessary to drill a great many holes in a plate, such as a boiler fire-box or the like. Adaptors are also made nowadays for fitting taps into small drilling machines so that it is possible to tap small holes by this machine, instead of having to use hand labour. *Shaping machines* are really planers on a small scale with moving Ts.; the mechanism employed is of the steam engine type, i.e. the T. is moved by means of a crank and connecting rod; it is used on light work for facing up cottars and the like. *Boring mills* may be either horizontal or vertical; they are largely used for cylinders and guns, and the

like. Cylinders 12 ft. in diameter may be bored on these machines, while holes 15 or 16 in. in diameter can be bored for some 60 ft. in length, e.g. on such work as guns and propeller shafts. In addition to these machines, the wood-worker is now provided with a universal wood-working machine that will cut holes of any shape, etc.; so much so that a high percentage of furniture is machine-made to-day.

Consult Barritt, *The Care and Operation of Machine Tools*; Markham, *Tool Making* (American Technical Society).

Toombs, Robert (1810-85), American statesman, was b. in Georgia and educated at the University of Georgia and the University of Virginia. After being a number of terms in the House of Representatives of his state, he was a Congressman from Georgia from 1845 to 1853, and U.S. Senator from Georgia from 1853 to 1861. All his life he alternated between being a fire-eater and a cool, far-seeing statesman. When most of the S. was afire for the annexation of Texas and later for the war with Mexico, he opposed both. When the Whig party disappeared he became a Democrat. Being from the S., he favoured the admission of Kansas with the trick pro-slavery constitution. Upon Lincoln's election as President he advocated Georgia's secession. When the Southern Confederacy was formed and Jefferson Davis was named President, the latter appointed a Cabinet whose only strong men were T. as Secretary of State and Judah P. Benjamin as Attorney-General. When the grave question of attacking Fort Sumter, at the entrance to the harbour of Charleston, S. Carolina, was discussed, the fiery T. was the one who gave advice of cool caution. He said such an attack would be suicidal. It would lose the Confederacy every friend it had in the N. He was overruled. Later he quarrelled with Davis and left the Cabinet to become Inspector-General of the Georgia troops. When the war was lost, he remained in exile in Europe until 1867. He then returned to his native state, where he practised law until his death.

Toothache, see **TEETH**.

Toothwort (*Lathræa*), a genus of plants (order Orobanchaceæ), partly parasitic and partly saprophytic. *L. squamaria*, the only British species, has a fleshy branched rhizome clothed with tooth-like scales and bearing a raceme of drooping dull red flowers.

Toowoomba, a tn. of Queensland, Australia, 101 m. W. of Brisbane, is situated in a pastoral and agricultural dist. It has condensed milk, bacon,

and butter factories, foundries, and railway workshops. Pop. (1928) 25,150.

Topaz, a mineral crystallising in the rhombic system and having a perfect basal cleavage. It is a silicate of alumina with fluoride (AlF_2SiO_4). The colour of T. varies from yellow to white, blue or pink, and the mineral is more or less transparent ($H=8$, sp. gr. 3.5). On heating it becomes electrified (pyroelectric). T. is used extensively in jewellery; the pink colour of most of the jewellers' stones, however, is produced artificially, the stone being wrapped in amadou (tinder), which is ignited and allowed to smoulder away. In the British Isles the stone has been found in Cornwall, Aberdeen, and the Mourne Mts. Fine specimens are obtainable in Brazil, Peru, Ceylon, and Siberia. See STONES, PRECIOUS.

Tope (Hind. *tōp*, prob. from Pali *thūpo*, Sanskrit *stūpa*, a mound), the common name for a kind of Buddhist monument erected by monks to enshrine relics of Buddha or his disciples. Most Ts. take the form of a tumulus of masonry, shaped like a dome or tower, and often surrounded by an elaborately-carved stone railing with lofty gates far higher than the railings. When the purpose of the T. is for the preservation of relics, it is called a *dagoba*, and when its purpose is merely to commemorate some event, the usual name is *stupa*, the word T. only connoting the external shape. There are numerous specimens in India and South-Eastern Asia, and it is assumed by archaeologists that they were all constructed between 200 B.C. and A.D. 100. The most anct. are dome-shaped and are built on a cylindrical or polygonal base which rises in terraces. The most noteworthy is at Sānci in Bhopal, but the ruins in the village of Amravati in the Kistna dist. of Madras were those of the finest Buddhist monument in India. One of the largest of those which are raised on terraces is that at Manikyalā near Rawal Pindi in the Punjab, and all Ts. in the Punjab are, as this one, plain hemispheres in form. A peculiar feature of the T. is the structure at the cone or apex, which is shaped like an open umbrella and called the *tee*, but generally there is now only a flat space at the apex where once the *tee* stood.

Topoka, the cap. of Kansas, U.S.A., and co. seat of Shawnee co., on the Kansas R., 53 m. W. of Kansas City. It is a large manufacturing centre, and in the vicinity are quarries and coal mines. Pop. 64,120.

Tophane, see CONSTANTINOPLE.

Tophet ('the place of burning'), a

high place in the valley of Hinnom, where sacrifices used to be offered to Moloch.

Topiary, the pruning of trees and shrubs into formal and fanciful shapes. The art was most developed in the sixteenth century, and has been revived in recent years. It requires a great deal of trouble and some skill to check the over-development of branches and shoots. No tree is better suited to T. than the yew, but the holly, box, and hawthorn bear training and clipping well.

Töplitz, see TEPLITZ.

Toplady, Augustus Montague (1737-78), an Anglican divine and hymn-writer, b. at Farnham, Surrey. He entered the Church in 1762, and became vicar of Harpford (1766) and Broadhembury (1768). In 1775 he became minister at the French Calvinist Chapel in London. His best-known hymn is 'Rock of Ages.'

Topsail, see SAILS and RIGGING.

Torbanite, see BOGHEAD COAL.

Tor Bay, a fine harbour in the S.E. of Devonshire, Eng. It was the landing place of William of Orange (1688).

Tordenskjold, Peder (1691-1720), Norwegian-Danish vice-admiral; b. Oct. 28, at Trondhjem, Norway; tenth son of Jan Wessel, councillor of that place, of Dutch descent. Apprenticed to a tailor, then to a barber; went as stowaway to Copenhagen, 1704. Made voyages to the Indies; became cadet, 1709; and, in war with Sweden, cruised two years in an armed sloop off Swedish coasts. In a tight place, 1714, he fraternised with enemy crew and drank King of Sweden's health—court-martialled, but acquitted. As captain, contributed largely to Gabel's victory of April 24, 1715, taking many prizes. At Rugen, Aug. 8, captured a ship under the eyes of Charles XII. Ennobled by Frederick IV., Feb. 24, 1716, by title 'Tordenskjold' (Thunder-shield). Same year, captured in Dynekl a whole flotilla. Rear-admiral, 1718. Took Marstrand, July 1719. Vice-admiral same year. Presented to King of England, 1720, at Hanover. There, took part of young man cheated at play by a Swedish officer who, in ensuing sword-duel, killed T., Nov. 20.

Torgau, a tn. of Prussia, in the prov. of Saxony, on the Elbe, 30 m. N.E. of Leipzig. The Battle of T. was fought in the vicinity, Nov. 3, 1760, when Frederick the Great defeated the Austrians under Daun. Its fortifications were levelled in 1889. Glass, pottery, and gloves are made. Pop. 13,550.

Tornado, a cyclonic disturbance of the atmosphere, occurring usually in

the S.E. of a slow-moving 'primary'; most common in U.S.A., E. of 100° W. long., but particularly in Kansas and Illinois. Usually it arises suddenly on a sultry summer afternoon. It is of small diameter, a few hundred yards, but of relatively great vertical height. The upper portion is marked by a swirling funnel-shaped cloud which sways and rises and falls. Local surface conditions give rise to rapid heating of a column of moist air by the sun, and sudden expansion takes place; the condensing moisture adds to the temperature of the whirling air and very low pressure results. The force developed cuts a clean path through town or country; trees are uprooted and whirled outside the track; houses are 'burst' by their own internal pressure as the low pressure encloses them; the damage

Pacific railroads. It has a great shipping interest on the Great Lakes, and its fine, well-sheltered harbour has recently been both improved and extended. A great distributing centre, it has the largest live-stock market in Canada, with a winter agric. fair. It has over 2350 factories and works, its chief industries being foundries, brewing, distilling, meat-packing, flour-milling, and the manuf. of ships, carriages, biscuits, agricultural implements, pianos, and bicycles; there are also gas works, electric plants, etc. In 1929 its imports realised 266,865,150 dollars, and its exports 1,532,200. Water-borne trade at T. harbour in 1931 reached a total of 2,115,830 short tons. Hydro-electric power is supplied by the Niagara Falls, and T. is served by electric railways. It has a public aerodrome. Here is held the



TORONTO FROM LAKE ONTARIO

to houses often leads to escape of gas and disastrous fires. The tract extends usually for about 30 m., and the energy is dissipated in about an hour. A very destructive T. visited S. Wales in Oct. 1913, springing up near Merthyr-Tydvil and dissipating in Cheshire. The water-spout at sea is a similar phenomenon. See Mill, *Realm of Nature* (new ed.), 1913; Davis, *Elementary Meteorology*, 1894.

Toro, a city of Zamora prov., Spain, on the r. b. of the Douro R. T. is an ancient fortified city, containing a Romanesque cathedral (twelfth century) and the Santa Cruz Palace, the meeting-place of the Cortes of 1371, 1442, and 1505. Pop. 7540.

Toronto, the cap. of the prov. of Ontario, Canada, is in York Co., on a bay on the N. shore of Lake Ontario, 333 m. S.W. of Montreal. In pop. and as a commercial centre Toronto is the second city of Canada, and is connected with all parts of the U.S.A. and Canada by fast steamers and by the Canadian National and Canadian

largest annual exhibition held anywhere in the world, the Canadian National Exhibition, which in Aug. and Sept. occupies a park of 350 acs. The Provincial University of T., founded in 1827, has over 7358 students in 1932. There are also the Victoria, Trinity College, and MacMaster universities. Other interesting buildings in the city are St. James's (Anglican) and St. Michael's (Rom. Catholic) cathedrals, the Provincial Legislative buildings, the city hall, the art museum, the Law, University, Legislature, and Public Libraries, and the various colleges—Knox, Wycliffe, St. Michael's, etc.—federated with the university. There are several parks, including High, Riverdale, Island, and Sunnybrook. T. was founded in 1794 on the site of a Ft. fort, and was first named York. Three years later it became the cap. of Ontario, and in 1834 a city. Its name, of Indian origin, means 'a place of meeting.' Pop. (1931) 627,582, an increase of 20 per cent. since the last census.

See *Toronto Municipal Handbook*, 1932.

Torpedo, or **Electric Ray**, a genus of fishes, one species of which (*T. hebertans*) is occasionally found off the coast of England. Ts. are characterised by the possession of an electric organ which is present between the head and the pectoral fin of each side. The shock which it is capable of administering can disable a man.

Torpedo. In the days before the advent of the locomotive T., all submarine explosive devices, whether stationary or mobile, were referred to as Ts. These early Ts. were of many different forms; one type was towed across the bows of enemy vessels by small torpedo-boats (*q.v.*), another was the 'spar' T., which was carried on the end of a spar at the bows of a launch. The spar was arranged to lower the T. below the water-line just before striking; later models being fired electrically. As the result of equipping battleships with additional

energy supplied through a wire from the parent ship or ashore. It could be steered in any direction. Another ingenious weapon was the *Howell T.*, which was driven by a flywheel suitably geared to propellers. Energy was stored in a relatively heavy flywheel before launching, from a special engine on board ship which caused the wheel to rotate at about 9000 revolutions per minute. This also acted as a gyroscope and helped the T. to travel accurately on its aimed course, though the hydrostatic valve and pendulum steering mechanism were also used. *Whitehead's T.* was due to ideas of Captain Luppis of the Austrian navy, but was first practically evolved by Whitehead in 1866, whose practical mechanical skill completely altered the original ideas. The first type was too uncertain in vertical direction, but the introduction of the 'balance chamber,' in 1868, obviated the troubles of skimming and diving. The secret was pur-

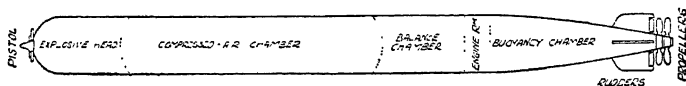


DIAGRAM OF TORPEDO

small guns and the installation of searchlights, the use of the above kinds of T. became a practical impossibility, and efforts were concentrated upon the development of a type which could drive itself. The *Brenan T.*, used in harbour protection, and under the military authorities, was invented by a watchmaker of the name of Melbourne, and purchased in 1882 by the British Gov. It is not now in official use. It was driven by means of two steel piano wires wound on large drums driven by an engine ashore. These were wound round two small drums inside the T. and the winding up on the shore drums caused a rapid unwinding of fine wires on reels carried on the two propeller shafts, which worked in opposite directions. The speed of the T. thus increased with the pull of the shore wires. By an ingenious arrangement of a collar on a hollow shaft, working on a thread on the propeller shaft, a difference in speed of the shore drums, by causing the collar to travel, actuated the rudders, giving a steering radius of 40° either side 'right-ahead.' A flag or Holme's light enabled its course to be followed and directed by the operator. The *Sims-Edison T.* was also cable controlled, but was driven by an electric motor from

chased by the British Gov. after successful trials, and in 1876 the servomotor was added by Whitehead. Improvement continued, and to-day every navy uses the Whitehead T. in a highly developed form, though there are many patterns. The shape of the modern T. resembles a cigar with a rounded or blunt nose, upwards of 20 ft. long by as many inches in diameter and constructed of special steel. It is divided into a number of compartments: the explosive head, compressed-air chamber, balance chamber, engine room, and buoyancy chamber. In war-time about 500 lb. of high explosive are stored in the head and are fired on contact with the target by means of an arrangement, called a pistol, located in the extreme nose. The blow need not be directly head-on to detonate the charge, there being other side-projections capable of causing the explosion in the event of an oblique strike. To render the T. safe whilst being handled and until it is clear of the ship, there are three safety devices fitted, viz. a safety pin which is first withdrawn; small vanes, so set that the rush of the T. through the water causes them to rotate and unscrew until they fall off; and lastly, the force of impact against the target must be sufficient to

shear through another pin before finally the point of the striker fires the charge. For peace-time practice, special heads are fitted containing water and cork. The head is bolted on to the compressed-air chamber, which is forged from high-tensile steel and contains air at a pressure of over one ton per sq. in. supplied from air compressors on board the warship. Next follows the balance chamber containing the mechanism for controlling the depth the T. will run at, as well as, in the later types, vessels containing fuel, water, and a special heater apparatus. Depth control is effected by a swinging weight or pendulum which, being affected by any alteration in tilt, sets in motion a servo-motor, contained in the engine room, which provides the necessary power to actuate the horizontal rudders which correct the vertical deflection of the T. from its proper depth. A hydrostatic valve is fitted to ensure that the T. attains the correct depth. The engines, placed abaft the balance chamber, are of the four-cylinder, single-acting, Brotherhood type and are marvels of ingenuity. Normally they are driven by compressed air, though in latest types fuel and air are burnt in a special generator and form steam which is led to the engines. The exhaust is allowed to escape and rises to the surface in the form of bubbles, making a track which can be clearly seen from the bridge of the ship attacked. Next comes the buoyancy chamber, whose primary purpose is to give the necessary buoyancy to the T. Herein is situated the gyroscope, which rotates at high speed, is delicately suspended in gimbals, and is connected to the vertical rudders. The gyroscope tends always to maintain the direction of its spinning axis, and this is used in conjunction with a servo-motor to actuate the vertical rudders and correct any deflection as soon as it occurs. At the tail are situated the vertical and horizontal rudders which keep the T. on its course and prevent it from sinking or jumping out of the water. Behind the rudders are situated two four-bladed propellers, driven by the engines, which rotate in opposite directions, thus preventing the T. from any heeling due to the torque reaction which would occur if only one screw were fitted. Exact details of the latest types are secret, but figures which have been published show that ranges exceeding 15,000 yds. and speeds of over 45 knots have been obtained. Efforts are being made to control them by wireless. T. tubes from which Ts. are ejected are either submerged, as in most large ships and

submarines, or above water, as fitted in light cruisers and destroyers, and the firing impulse is given by compressed air or explosive. Another method of discharging them is by means of special dropping-gear from aircraft. The submerged tube has the advantages that the T. cannot be damaged by shell-fire when within the tube prior to discharge and that the moment of release cannot be detected by the enemy. In this type of tube the orifice can be closed by a watertight door, when a rear door may be opened to allow the T. to be placed in position. To fire, the rear door is closed, the outer door opened, and a blast of compressed air blows the T. out of the tube. When ejected from a tube on the broadside, the difficulty was to get the T. out of the tube safely owing to the rush of water past the orifice tending to deflect the nose astern as it emerged before the tail was clear and thus causing damage. This is overcome by pushing out on the fore side of the tube a shield bar which provides support to the whole length of the T. until it clears the ship, when it is automatically released. T. nets were introduced to afford protection to battleships from submarines and were suspended from the ends of hollow steel spars, all round the ship at some distance from the hull. They consisted of a mesh of steel wire grummets, 6 in. diameter, connected with galvanised steel wire rings, and were weighted with heavy chains at their lower ends to keep them hanging upright. When not in use the nets were packed on a special ledge round the top of the hull and the spars were swung in flat against the ship's side. During the Great War and subsequently, nets were not used by the British navy; they were cumbersome and offered great resistance to the motion of the ship whilst affording no real protection. Before the War, torpedoes carried an implement fitted to the nose which enabled them to cut the mesh of the nets and so penetrate to the vessel. Modern battleships rely for T. protection upon 'blisters.' These are really an outer skin fitted below the water-line on the hull, and the space inside is utilised for carrying fuel oil. The T. explodes on striking the skin of the 'blister,' but no damage is sustained by the hull proper.

Torpedo Boat and Torpedo Gunboat. Both these types of craft are obsolete in modern navies, having been replaced by the torpedo boat destroyer (*q.v.*). The earliest type of torpedo boat was merely a launch fitted with spar torpedoes; later the method adopted was to tow the torpedo

across the bows of the enemy vessel. The first T. B. was built by Messrs. Thornycroft for the Norwegian Gov. in 1873, for the 'towing' type of torpedo. In 1879 the British Admiralty had built the torpedo boat, *Lightning*, of 27 tons, 19 knots speed, and fitted with a bow torpedo tube for launching a locomotive torpedo of the Whitehead type. As time went on this class of vessel grew in size, speed, and armament and became a grave source of danger to battleships, necessitating other means of countering them than quick-firing guns and torpedo nets, particularly as torpedoes were fitted with net cutters. A special class of vessels, termed 'torpedo gunboats' or 'torpedo catchers,' was introduced to destroy the T. Bs. They were armed with 4-in. and 3-pounder quick-firing guns, and later, torpedo tubes, but were never successful, owing primarily to their lack of speed, and were entirely superseded by the torpedo boat destroyer, which was able to combine effectively the functions of torpedo boat and catcher.

Torpedo Boat Destroyer. A small, fast, unarmoured warship heavily armed with torpedo tubes and guns up to 4.7 in. This class of vessel was developed to supersede the 'torpedo gunboat' or 'torpedo catcher,' which in turn had been built to destroy torpedo boats. The destroyer acts in flotillas and her duties are to sink the destroyers of the enemy by gunfire, torpedo the larger enemy ships, protect her own battle fleet from torpedo attack, and set up smoke-screens. During the Great War destroyers were also used for escorting convoys of merchant shipping, combating the submarines by means of explosive depth-charges, and as minelayers. The first British destroyer was built by Messrs. Yarrow in 1893 and named *Harvock*. She was much lighter and smaller than the 'catchers' she was replacing, but had relatively great length with a low freeboard and was equipped with high-speed engines capable of developing 3500 brake horse-power which enabled a speed of 26½ knots to be attained. The great advance in speed of this vessel and her sister ships over the existing torpedo boats was due mainly to the alteration in lines, small draught, high engine power, and reduction in weight brought about by using thinner plates—in some cases they were only ½ in. thick—and cutting out armour plating. So successful were these ships that a large programme of destroyers was decided upon, and each year saw an increase in tonnage, speed and armament. Landmarks in the design of destroyers were the introduction of the water-tube

boiler, replacement of reciprocating engines by steam-turbines, and the use of oil fuel instead of coal. Torpedo tubes used to be rigidly fixed in the bows, but as the speed of the torpedo was improved, these had to be abolished because, after firing, the destroyer at first overran the torpedo, which soon gathered way and hit the parent ship behind. Details of a modern English destroyer of the 'V' class are: 1300 tons displacement, 27,000 brake horse-power, speed 34 knots, four 4.7-in. guns, six 21-in. torpedo tubes in triple mountings, 3-in. anti-aircraft gun, and two small 2-pounder, quick-firing guns. The flotilla-leader is a kind of super-destroyer, being larger and more powerfully armed than the others, and acts as flagship to destroyer flotillas. The latest type is of 1800 tons and with engines of 40,000 brake horse-power can maintain a speed of 36 knots. The armament consists of five 4.7-in. guns, one 3-in. and two 2-pounder anti-aircraft guns, in addition to six 21-in. triple-mounted torpedo tubes.

Torpedo Ejector, or Torpedo Tube, see under TORPEDO.

Torpedo-net Cutter, see TORPEDO.

Torpedo-nets, see TORPEDO.

Torquatus, the name of a patrician family of the gens Manlia. *Titus Manlius Imperiosus* fought against the Gauls (361 B.C.), winning his name T. by taking the necklace (*torques*) from the body of a mighty Gaul slain by him in single combat. He was dictator 353 and 349, and consul 347, 344, and 340. With P. Decius Mus he defeated the Latins at the foot of Vesuvius. (See Livy, iv. 5, viii. 3-12; Cic. *De Off.* iii. 31.) *Titus Manlius*, conqueror of the Sardinians, was consul 235 and 224, and censor 231 B.C. With hereditary sternness he opposed the ransom of the Roman prisoners of Cannæ in the Senate (216). He was dictator in 210. *Lucius Manlius*, consul with Cotta (65 B.C.), helped to suppress Catiline's conspiracy (63), and supported Cicero in his exile (58). *Lucius Manlius*, son of above, was prætor 49 B.C., and opposed Cæsar on the outbreak of civil war. Obligated to surrender Oricum, he was taken prisoner (48), but released. He fought again in Africa, but was captured and slain (46) on the defeat of the Pompeians. *A. Manlius*, friend of Cicero, presided at the trial of Milo for bribery as prætor (52 B.C.). He sided with Pompey in the civil war, and was an exile at Athens (45).

Torquay, a municipal bor., seaport, and watering-place, on Tor Bay, S.E. Devonshire. Its picturesque scenery and mild climate make it a favourite

health resort. Terra-cotta clay and marble are found in the neighbourhood. Pop. (1931) 46,165.

Torque Amplifier and Torque Converter. It is often necessary for an operator to be able to rotate massive pieces of mechanism such as the rudder of a liner or the guns of a ship. The operator can only exert a feeble twist or torque on the controlling device fixed in his observation post, so that some intermediate mechanism is required to magnify or amplify this torque in order to perform the required operations. This intermediate mechanism is called a *torque amplifier* and the principle of its action is as follows. The operator applies a feeble torque to a control-shaft that causes friction bands to engage with two drums rotating in opposite directions. The bands also engage with a shaft connected to the mechanism to be rotated and the magnitude of the torque applied to this shaft depends on the friction between the bands and the rotating drums. Hence the feeble torque provided by the operator controls the extent to which the bands are brought into contact with the drums, while the final torque applied to the mechanism depends on the speed of rotation of the drums.

The *torque converter* is a device that eliminates the necessity for a gearbox in machines such as motor cars. The engine that supplies the motive power is coupled to the driving shaft through a T.C. which automatically adjusts the magnitude of the torque applied to the driving shaft according to the load to be overcome.

Torquemada, Thomas de (1420-98), a Dominican friar who in 1483 was entrusted by Queen Isabella with the reform of the Spanish Inquisition. Ascetic in his own private life, he was severe to the point of cruelty towards suspected or convicted heretics. Of 100,000 said to have been accused, 1000 were put to death, others fined and penanced. See Walsh, *Isabella of Spain*, 1931.

Torre Annunziata, a seaport and watering place of Italy, prov. of Naples. It has a royal manufactory of arms, fisheries, mineral springs, and manufs. macaroni and paper. Pop. 40,000.

Torre del Greco, a watering-place and fishing tn. of Italy, in the prov. of Naples, situated at the foot of Vesuvius, which has often damaged the tn. by eruptions. It has ship-building yards, and exports cameos, worked coral, lava, etc. Pop. 45,000.

Torrens, Lake, a large salt lake of S. Australia, discovered by Eyre, 35 m. N. of Port Augusta. Its average breadth is 20 m., length 130 m. It becomes a marsh in dry weather.

Torrens, William Torrens M'Culagh (1813-94), an Irish social reformer; sat as assistant on the special commission through whose agency the workhouse system was extended to Ireland (1838). By publishing the *Industrial History of Free Nations* (1846), he furthered the anti-Corn Law movement. In 1863 he introduced the Artisans' Dwellings Bill to aid in the clearance of slums, and it was owing to him that in 1870 the London School Board was established.

Torres Strait, in the S. Pacific Ocean, between New Guinea and Australia, from 80 to 90 m. broad. It contains several islands, the chief of which are Clarence and Prince of Wales Is. Reefs and shoals abound, rendering navigation difficult.

Torres Vedras, a tn. with a Moorish citadel, on the Sizandró, in Portugal. Pop. 8000.

Torre Vieja, a small seaport of Alicante, Spain, with a large trade in salt. Pop. 8000.

Torricelli, Evangelista (1608-47), an Italian physicist, acted as Galileo's secretary, and was prompted to many of his discoveries by the study of that scientist's works. Besides making a barometer—an invention commemorated in the names of Torricellian tube and Torricellian vacuum—he solved the problem of the quadrature of the cycloid. *Opera Geometrica* (1644) is his principal work.

Torrigiano, Pietro (1470-1522), a sculptor, native of Florence. Having to flee from Florence in consequence of an assault on Michelangelo, T. went to Rome, where he was employed by Pope Alexander VI., and afterwards served as a soldier under the Duke Valentino. His talents recommended him to the favour of Henry VIII. His chief work was the tomb of Henry VII. in Westminster Abbey, which he completed in 1519.

Torrington: (1) A bor., on the Naugatuck R., in Litchfield co., Connecticut, U.S.A. Pop. (1930) 26,040. (2) Or Great T., a market tn. and mun. bor., on the Torridge, in Devonshire, England. Its Saxon name was Toritone. Pop. (1931) 2913.

Torrington, Viscount, see BYNG, GEORGE.

Torsion, a strain produced by a twisting motion, that is, by a couple acting in a plane at right angles to the axis of a prism. The distortion produced is a type of shearing stress. In the case of a cylinder the outer layers slide over the inner layers in the direction of the twist, so that, while the axis remains the same, the exterior takes on a screw-like appearance. Resistance to T. deter-

mines the rigidity of the bar, and resistance to permanent distortion depends upon its elasticity. The amount of 'torque' or twist required to produce T. in cylindrical bars of the same material varies as the fourth power of their diameters. In bars of section other than circular the rigidity is lessened, so that in practical application cylindrical bars are best adapted to resist a twisting strain.

Tort (Lat. *tortus*, twisted) is an act or omission giving rise to a remedy by action for damages which is not an action of contract, e.g. trespass (q.v.), slander, libel, detinue (q.v.), negligence and nuisance (q.v.), and assault. A T. has some of the characteristics of a criminal offence, but is to be distinguished therefrom, though many crimes necessarily include a T. (e.g. a public nuisance causing special damage to an individual: rape), but every T. does not amount to a crime (e.g. slander and seduction are merely Ts.), nor does every crime amount to a T. (e.g. blasphemy and treason). Where the T. is punishable summarily and the magistrates dismiss the case, no further proceedings, criminal or civil, can be taken. A cause of action in contract may co-exist with a T., i.e. the same facts may give A a remedy in contract against B and also a remedy in T. against B, e.g. where A is injured in alighting on a defective platform, belonging to B railway company, from a train belonging to Crailway company which enjoys running powers over B's line (Pollock, *On Torts*); conversely there may be two causes of action, one in T. and one in contract with a common defendant; and generally, when a contract inevitably gives rise to duties independently of the contract itself, the breach of them often amounts to a T., e.g. where A purchases goods on credit from B, and B resells before A makes default in payment, A can sue B for conversion. Consult Salmond, *Torts* (7th ed.), 1928; C. S. Kenny, *A Selection of Cases illustrative of the English Law of Tort* (5th ed.), 1928.

Torticollis, see STIFF NECK.

Tortoise, a name for all the land Chelonians, and often applied to all members of the order Chelonina with the exception of the marine Chelonians or turtles. All members of the order are cold-blooded, four-footed reptiles, without teeth, and are protected by a shell, or leathery case. All lay eggs, but otherwise there is wide diversity in their habits. They are of great geological age, and their tenacity of life has enabled them to survive where more recent animals of higher types have become extinct. The most familiar example of the land Ts.

(*Testudines*) is the common or Gk. T. (*Testudo graeca*) which occurs around the Mediterranean and is much kept as a pet. It is entirely vegetarian in its diet, though frequently sold as an insect killer. Another T. which is sometimes offered for sale is the river T. (*Emys europaea*); this is a type of the river and marsh Ts. (*Emydes*) and is distinguished by its small yellow spots; this eats insects, worms, etc. Among the mud or soft Ts. (*Trionycides*) are various American and Indian species which are frequently killed for food, the flesh being well flavoured. The most important of the turtles (*Cheloniades*) are the edible green turtle (*Chelonia mydas*) and the hawksbill turtle (*C. imbricata*), from which tortoise-shell is derived.

Tortoise Plant, see TESTUDINARIA.

Tortoise-shell, in commerce, is the horny plates of the hawksbill turtle (*Chelonia imbricata*). Great cruelty has been exercised in removing the plates from living turtles, but the finest T. is derived from shells immersed in boiling water immediately after the death of the animal. Numerous imitations and substitutes are made.

Tortola, see VIRGIN ISLANDS.

Tortosa, a fortified tn. of Spain, in Catalonia, on the Ebro, 96 m. S.E. of Zaragoza. It is a bishop's see, with a fine Gothic cathedral, dating from the fourteenth century. It has trade in majolica, paper, soap, and leather. Pop. 33,000.

Torture. The application of bodily pain in order to extort evidence from witnesses or confessions from accused persons has been a feature of almost every judicial system of the world. In England the practice was virtually abolished in 1640. T. was abolished in France at the Revolution (1789); in Scotland by an Act passed in 1709. It was unknown in the Ger. municipalities until the end of the fourteenth century, but once introduced it remained lawful (though only intermittently resorted to after 1750) in Hanover, Bavaria, and some of the smaller Ger. states until the first decade of the nineteenth century, while in Austria, Prussia, and Saxony it virtually ceased in 1750, and in Russia was finally abolished in 1801. The customary modes of T. were the rack, wheel, and thumb-screw, although in England in earlier times it was inflicted by the boot, by fire or water and by *peine forte et dure*, i.e. by piling weights on the prostrate body of the victim.

Toru Dutt, see DUTT, TORU, or TARULATA.

Torula, see YEAST.

Tory, a synonym, though historic-

ally inappropriate, for a Conservative. The word T. is Irish, and signified, during the time of the wars in Ireland in the reign of Elizabeth, a kind of robber who, being attached to neither army, preyed generally upon the country without distinction of Eng. or Spaniard. They were especially prominent in the Protestant massacres of 1641. From this the term came to be applied to a body of men who, in 1680, appear to have ridiculed the Popish Plot and yet encouraged the Papists to revive it. Their political object was to banish the Duke of Monmouth and recall the Duke of York, and to further their end they endeavoured to thwart the Bill of Exclusion (from their abhorrence to which they were called 'abhorrrers' and their opponents the 'petitioners'). Ultimately the 'abhorrrers' and 'petitioners' became identified with the terms Tories and Whigs respectively. See *Edinburgh Review*, vol. 1., 1830.

Toscanini, Arturo, Italian conductor, b. Parma, March 25, 1867. Studied at the Parma Conservatory, where he gained his diploma in cello and composition in 1885. Began his career as a conductor in 1886 at Rio de Janeiro. His reputation rapidly gained ground. In Turin, where he remained for several years, he directed first performance in 1886 of Catalini's *Ednea*. In 1898 he was appointed to La Scala, Milan, and in 1907 nominated conductor of the Metropolitan, New York. He returned to La Scala in 1921, and is now the artistic director. The concerts conducted by him in Augusteo in Rome have become memorable. Many new Italian operas were presented by T. See G. M. Ciampelli, *Arturo Toscanini*, 1923.

Tosti, Francesco Paolo (1846-1916), Italian composer, b. Ortona a Mare, d. at Rome. Popular all over the world for his songs. He came to London when about 30 years old and held the position of singing teacher at the R.A.M. In 1885 he was knighted by Queen Victoria, with whom he was a favourite composer. His early work recalls the folk-songs of his native Abruzzo.

Tostig (d. 1066), Earl of Northumbria, was the son of Earl Godwin. In 1065 he was banished from his realm because of his cruel, repressive measures. The following year he returned with Hardrada, King of Norway, and was slain at Stamford Bridge by King Harold.

Totalisator, a machine, or apparatus, set up on race-courses for recording bets on horse races and paying out of winnings, without the intervention of a bookmaker.

Ts. have been set up at a number of race-courses in Great Britain, and the Second Annual Report for the year 1930 of the Race-course Betting Control Board shows that at the end of that year sixty-four race-courses were provided with T. facilities in buildings and, in addition, a further twenty-eight race-courses had facilities in tents, accounting in all for 456 racing days. The Board is constituted under the Race-course Betting Act, 1928, with a view to benefiting, by the legalisation and establishment of Ts. on race-courses in Great Britain, the horse-breeding industry, the sport of horse racing, and charities. The Board's income is derived by a deduction of ten per cent. from the moneys staked, and these earnings are paid into a 'T. fund.' The system is welcomed both by race-course owners and the racing public, and the facilities offered are increasingly popular. Owing partly to the widespread distribution of the race-courses throughout the country and the limited number of days on which racing takes place in any particular locality, the cost of operation is necessarily high. There is, however, no doubt that the effect of the system is to popularise horse-racing and to eliminate the undesirable element sometimes connected with placing bets with private individuals. The mere operation of making a bet is in fact entirely devoid of unnecessary fuss and the seller receiving the bet has, of course, no interest at stake. Substantial buildings, tending to become standardised in design, are erected on race-courses for the work of the staff, but the indicators are less uniform. An electric lamp indicator has proved satisfactory where an electrical T. is installed, but where subsidiary indicators and indicators with hand operated Ts. are used the most suitable design has yet to be determined. In some cases a primitive kind of black-board has been used, in others an indicator somewhat like a cricket scoring-board and also a rising 'thermometer' column have been tried. On a fully mechanised installation, at the time of the issue of the tickets, each 2s. unit is automatically added and recorded on a miniature indicator in the control room and simultaneously indicated to the public on the main indicators. The prices of tickets on a race-course are 2s., 10s., £1, £10, and on some race courses, £100. Facilities also exist for 'off-the-course' betting. Two representatives each of the Secretary of State for the Home Department, the Jockey Club and the National Hunt Committee and one representative each of the Secretary of

State for Scotland, the Chancellor of the Exchequer, Tattersalls' Committee, the Minister of Agriculture and Fisheries, and the Race-course Association, Ltd., form the Race-course Betting Control Board. For discussion of T. and *pari mutuel* systems, see under BETTING.

Totana, a tn. in the prov. of Murcia, E. Spain. Chief industries, flax-weaving, and the manuf. of leather and pottery. Pop. 14,986.

Totemism is a belief prevailing among primitive peoples of blood-kinship with or descent from an animal or plant. The word is derived from the Algonquian Indian *otem*, a totem or guardian spirit, or rather from that form of it, *totem*, which signifies 'my otem' or guardian spirit (pronounced *odaim* and *todaim*). The argument of Andrew Lang that totemic or symbolic names, as 'the Snake' or 'the Wolf,' were given by rival and neighbouring tribes to communities which adopted these nicknames, is highly ingenious, but not altogether satisfactory. Certain savage peoples regard the points of the compass as being under the dominion of various animal eponyms, which in reality are minor deities, and it is not impossible that this might in some measure account for T. Still, it would not account for plant totems. Some tribes carve representations of their totems on the so-called *totem-poles*. T. is at the root of nearly every mythology, and accounts for such mythologic phenomena as the animal-headed gods of Egypt, which were merely anthropomorphic totems in a state of high evolution. The system was certainly in vogue among the ancient Britons, Hebrews, Gks., and many other European and Asiatic peoples, and still is so among, notably, the N. American Indians and Australian aborigines. In several Indian 'nations' each individual of a tribe possesses a personal totem which he receives in a dream induced by drugs or hunger at the age of puberty. The idea of blood-kinship among the members of a totem tribe renders it incestuous for its members to intermarry, so that they are compelled to find spouses from another community. Hence also it is 'wrong' to kill a blood-brother. Family crests are regarded as of totemic origin. Indeed the results and vestiges of the system may be remarked as still existent among our modern institutions. Consult Sir J. G. Frazer, *Totemism and Exogamy*, 1910; Lang, *Secret of the Totem*; Schmidt, *Origin and Growth of Religion*, 1930.

Totila (d. 552), King of the Ostrogoths in Italy, was proclaimed in 541. He at once commenced the restora-

tion of the kingdom of Italy and gained a victory over the Romans near Faenza. Continuing his victorious march towards Rome, he besieged that city in 546, and captured it the same year. In 547 Belisarius recovered possession and repulsed three assaults of T., who did not succeed in again taking the city till 549. Owing to T.'s continued successes the Emperor Justinian sent a large army against him, led by the eunuch Narses, who encountered T. at Taginae, defeated and slew him.

Totnes (the *Totenets* of Saxon times), an auct. market tn., with cider breweries, on the Dart, in Devonshire, England. Pop. (1931) 4525.

Tottenham, an urban district of Middlesex, forming part of Greater London. The area is 3014 acs., and the pop. (1931) 157,748.

Toucans (*Rhamphastos*), a genus of birds, natives of tropical America, characterised by their enormous bill and by their habit of bringing up their food after swallowing it in order to masticate it. In confinement they are almost omnivorous, but in a wild state they live chiefly on fruit. The plumage is brilliantly coloured.

Touch is the sensation due to the stimuli of pressure and contact acting on the body. There are two components of this sensation, one of simple pressure, and the other of the locality or region of application of the pressure. Sensitivity to pressure may be estimated by the ability to perceive the pressure due to small weights, from two to fifteen milligrams, on various parts of the body. Results show that the sensitivity of these parts varies considerably, parts of the face being most sensitive. Ability to perceive locality is measured by the minimum distance separating the two slightly blunt points of dividers when they can be felt as two separate points. In parts of the back, forearm, and thigh, the two points are felt as one, even when they are 2 in. apart. The tip of the tongue is most sensitive to locality, points 1 millimetre apart being distinguished separately. The peripheral nerves supplying the skin terminate either on or between epithelial cells, or in special corpuscles. Certain of these have long been regarded as tactile organs, but there is conflicting evidence with regard to this view. Although careful experiment has failed definitely to establish the connection between the corpuscles and the sensation of T., results seem to indicate that T. must be due to special nerve endings probably associated with

the corpuscles. H. Head, in an investigation of nerves and sensation, severed the cutaneous nerves of his arm, leaving the sub-cutaneous ones undisturbed. The area innervated by the severed nerve remained sensitive to pressures, but was insensitive to light Ts. and to locality. As the injured tract was regenerated, these sensitivities were slowly recovered. The importance of T. to blind people has been strikingly instanced in the case of Helen Keller, who, although blind and deaf, constructed a world of T. sensations, and perceived musical vibrations by means of her feet. Like all other sensations, that of T. is perceived by the brain, and is conveyed to it by afferent nerves (see NERVOUS SYSTEM). Consult Adrian, E. D., *The Basis of Sensation*; Halliburton, W. D., *Handbook of Physiology*; Stopford, J. S. B., *Sensation and the Sensory Pathway*.

Touchstone, a mineral (schist or jasper) used for testing the purity of gold and gold alloys, which leave characteristic streaks when rubbed over it. The test is probably over 2000 years old, and is still used.

Toul, a fortified tn. of France, in the dept. of Meurthe-et-Moselle, is seated on the Moselle, in a plain almost surrounded by mountains. Its fine old cathedral (now the church of St. Etienne) was begun about 965 and took five centuries to build. It capitulated to the Gers. during the Franco-Ger. War of 1870. Pop. (1926) 11,951.

Toulon (Toulon-sur-mer), anct. *Telo Martius*, a naval and military port and fortress of Var dept., France, on a bay of the Mediterranean. Next to Brest in Finistère it is the chief naval station and arsenal of France. The commercial port and tn. are on the N.E. side of the inner harbour. T. contains a mediæval cathedral, a torpedo station, a naval hospital and schools, extensive docks and arsenal, the Musée Bibliothèque, and a convict prison. Trade is not important, but wine, brandy, oil, and fruits are exported. Since 1912 T. has replaced Marseilles as the port of call for the Orient Steam Navigation Co.'s steamers to Egypt, Colombo, and Australia. Its original dockyards and arsenal were begun by Vauban in the seventeenth century, but destroyed by the British, to whom T. was yielded (Aug. 1793), being retaken by the Fr. republicans (Dec. 1793). Napoleon first won military fame during this memorable siege. The Fr. battleship *Liberté* caught fire and was blown up in T. harbour (1911), and as a result many ships near by were damaged and about 200 people perished. Pop. (1926) 115,120.

Toulouse, the cap. of the dept. of Haute-Garonne, France, lies on the Garonne. The riv. is spanned by the beautiful Pont-Neuf (1543-1626), which connects the city with St. Cyprien, its suburb. The Canal du Midi makes broad curves on the N. and E. The church of St. Sernin is a splendid Rom. basilica. The cathedral, a structure of many periods, contains the tombs of the counts of T. Noteworthy are the historic Capitole, the thirteenth-century brick church of the Jacobins, the Hôtel Bernuy, and the Musée with its unique collection of antiquities. The city is an archbishopric and the seat of a university. Besides a brisk commerce in corn, wine, and horses, all kinds of commodities, from steam engines to truffle pies, are manufactured. The national tobacco factory is here. In Rom. times the tn. was called Tolosa, and it was ruled by counts from 778 to 1271. The execution of the innocent Calas (1762) stains the record of its parliament. Pop. (1926) 180,771.

Touraco (*Corythæix*), a genus of beautiful African birds with an erectile crest and green and purple plumage.

Touraine, a prov. of anct. France, corresponding in the main to the modern prov. of Indre-et-Loire. Its cap. was Tours, and it was named from the Gallic tribe of the Turones, who settled here. See A. Macdonnell's *Touraine and its Story*.

Tourcoing, a tn. engaged in the cotton industry in the dept. of Nord, France. Pop. (1926) 81,379.

Tourgenieff, see TURGENIEV, IVAN SERGEIEVITCH.

Tourmaline, a mineral of variable composition, containing silica, aluminium, sodium, iron, magnesium, boron, etc. It crystallises in the hexagonal system, and has a rhombohedral cleavage. It also occurs massive and compact and in radiate fibrous masses. In colour it is generally black, more rarely green, blue and red, and, still more rarely, colourless. The black variety is termed schorl (*q.v.*). The mineral is dichroic, brittle, and pyroelectric. On account of its hardness (hardness 7.5; sp. gr. 3) it is sometimes cut as a gem. Varieties of T. are rubellite (red or pink), indicolite (indigo blue), Brazilian sapphire (Berlin blue and transparent), Brazilian emerald (green), and peridot of Ceylon (yellow). T. occurs in granite, gneiss, mica, and chlorite slates and granular limestones; it is found in Cornwall and Devon, Bavaria, and Switzerland. The rubellite variety, used as gems, is found in Ceylon, Siberia, and Ava. The clear transparent varieties are used for making polariscopes, *e.g.* the 'tourmaline pincette.'

Tournai (Flemish *Doornik*), a city with a noble Romanesque and Gothic cathedral and the tomb of Childeric, on the Scheldt, in Hainault, Belgium. Brussels carpets are manufactured. Pop. 37,108.

Tournament, Tourney, or Joust, a form of martial sport very popular in the Middle Ages. Combats took place on horseback between men of noble rank, and a prize was given by the lady of the T. to the knight who had displayed the greatest prowess. The invention of this particular form of military display was ascribed by Ruxner to Henry the Fowler (*d.* 936) and by others to Geoffroi de Preulli (*d.* 1066). The custom was introduced into England from France during the eleventh century. Ts. were regulated by definite rules and by very strict etiquette. The weapons used—spears, lances, swords, or daggers—had to be blunted. Each joust was attended by his squire, who acted as his second and could alone touch him if he fell. In spite of precautions, however, accidents and rough dealings were not infrequent. In England the T. developed about the fifteenth century into a military pageant, and finally was ousted by the masque.

Tourneur, Cyril (1875–1926), an Eng. dramatist, fought in the Low Countries, and died in Ireland after returning from Cecil's sorrowful expedition to Cadiz. Those competent to judge criticise his *Atheist's Tragedy* as sublime in style, but quite immature in plot, whereas they deem no praise too extravagant for the deeply passionate and satiric *Revenger's Tragedy*. His works were edited by J. Churton Collins in 1878, and his two chief plays are reprinted in the *Mermaid Series*.

Tourniquet, an instrument for preventing hæmorrhage by compressing the main artery of a limb. The usual form consists of two metallic plates, united by a thumb-screw, and a strap provided with a pad. The instrument is applied so that the pad is opposite the artery to be compressed, while the strap encircles the limb. By turning the thumb-screw the two metallic plates are gradually separated, so that the strap is drawn more tightly round the limb. A simple form of tourniquet for first-aid purposes may be contrived by tying a triangular bandage about the part, introducing a stick between limb and bandage, and twisting until the required compression is obtained.

Tours, the cap. of the dept. of Indre-et-Loire, France, 146 m. S.W. of Paris by rail. There are printing works, and silk, stained glass, sweet and automobile factories, etc., besides

a considerable traffic in wine and brandy. A great agricultural fair and exhibition is held here annually. T. is the seat of an archbishop, and boasts an historic cathedral, in which the gradual progress of architecture from 1170 till 1547 may be traced. The *Cæsarodunum* and later the *Civitas Turonorum* of the Romans, it was the scene of the ministrations of St. Martin and St. Gregory (*q.v.*), the cap. of Touraine, and the birthplace of Balzac. Pop. (1926) 77,192.

Tours, Battle of, see CHARLES MARTEL.

Tourville, Anne Hilarion de Coten- tin, Count de (1642–1701), a Fr. admiral and marshal of France, distinguished himself in the Battle of Palermo against the combined fleets of the Dutch and Spaniards (1676). But his most famous victory was won in 1690 off Beachy Head against the Dutch and Eng. The enemy, however, retrieved this disaster in 1692, when T. suffered defeat at La Hogue.

Toussaint, L'Ouverture (1743–1803), a liberator of Haiti, was a negro and by birth a slave. In 1791 he joined the negro rebels, and had soon, by his bravery and talents, established a wide sphere of influence. Joining the Fr. when they abolished slavery, he was in 1796 given control of the forces in San Domingo, and with them restored peace in the land. But when Napoleon tried to recover the slaves to their bondage, he took up arms against his former allies. Eventually he *d.* in a Fr. prison.

Tout, Thomas Frederick (1855–1929), Eng. historian; *b.* Sept. 28, in London. Educated St. Olave's School, Southwark; Balliol College, Oxford. Professor of history: St. David's College, Lampeter, 1881–90; Manchester University, 1890–1925. President, Royal Historical Society, 1925. Collaborated with York Powell in a *History of England for Schools*, 1890, 1898. Wrote: many articles in *Dictionary of National Biography*; *Edward I.*, 1893; *History of England, 1216–1377*, 1905; *The Place of the Reign of Edward II. in English History*, 1914; *France and England, their Relations in the Middle Ages and Now*, 1922. Died at Hampstead, Oct. 23.

Tovey, Donald Francis, Eng. composer, pianist, and conductor, *b.* Eton, July 17, 1875. From early childhood he was associated with Joachim (*q.v.*), who took a great interest in his mus. education. Entered Balliol College, Oxford, in 1894, and studied composition under Sir Walter Parratt and Sir Hubert Parry. First holder of Lewis Nettle-

ship Memorial Scholarship in Music. In 1900 gave concerts in London, Berlin and Vienna, and since 1914 has been Reid Prof. of Music at Edinburgh Univ. His successful efforts as a conductor are in connection with the Reid Orchestra, Edinburgh, founded 1924. T.'s music is distinguished by high and serious aims with marked regard for classic form and style, and as a pianist he must be placed in the front rank, his interpretations of Bach, Beethoven, and Brahms being of great value. As a teacher of music he is regarded with the greatest esteem. Was elected Hon. Fellow of R.C.M. in 1924.

Tower Bridge, The, London, England. The only bridge over the Thames below London Bridge, and built in 1886-94. It has two high Gothic towers 200 ft. apart and is connected with either bank by single-span suspension bridges. The span between the towers in the centre of the river consists of a pair of draw-bridges, each half pulling up against its tower to permit the passage of vessels, whilst high up near the top of the towers there is a permanent suspension bridge for pedestrians. It obtains its name from its proximity to the Tower of London.

Tower Hamlets, before 1918, a parl. bor. of E. London, returning seven members. The divisions are Bow and Bromley, Limehouse, Mile End, Poplar, St. George, Stepney, and Whitechapel.

Tower of London, an anct. stronghold on the R. Thames in the City of London, near Wapping, England. Underneath have been found traces of Rom. fortifications. The keep, or White Tower, was begun in 1078 under the direction of Gundulf, Bishop of Rochester, and all the other historic towers, including Wakefield Tower, where the crown jewels are kept, Beauchamp Tower, the place of confinement for so many unhappy and illustrious prisoners, and the Bloody Tower, where the Duke of Clarence and Edward IV.'s sons were murdered, are of later date. The Chaplain-General to the Army has his official quarters here. The Tower is still a fortress, and contains barracks within its precincts. It was a palace until Stuart times, when royalty came to see the lions (which were part of the menagerie) fight dogs and bears. But it is most notorious as a prison to which Sir Thomas More, Cranmer, Anne Boleyn, Katherine Howard, Lady Jane Grey, Sir Walter Raleigh, Sidney, and Russell were conveyed through the ominous Traitor's Gate. Other olden time prisoners were Sir William Wallace, King David II. and King James I. of Scotland, Queen

Elizabeth, William Penn, Hugh Latimer, and Nicholas Ridley. Thistlewood and his associates of the Cato Street Conspiracy passed through the Lion Gate to their trial at Newgate in 1820, this being the end of the active history of the T. of L. as a state prison. During the Great War, however, its use as a prison was revived, one of the prisoners being Karl Lody, the Ger. spy. The White Tower underwent many alterations in 1532, a passage being pierced through the wall of the north-eastern tower. Under Charles II. this tower was restored and the S. front staircase was repaired. In 1663 and 1701 Sir Christopher Wren 'Italianised' the Norman windows and under James II. and William III. various other 'improvements' were continued. It is almost needless to observe that many of the oldest features of the T. of L. were destroyed more than two centuries ago, and the responsibility for destruction is often, but erroneously, attributed to Cromwell. Among these were the Coldharbour Tower, the Great Hall, the Jewel House, and the Lantern Tower. State papers show that Charles II. demolished at least part of these buildings under the pretext of making improvements. But there was much vandalism for which it is difficult to assign any accurate date, e.g. that of the original internal decorations of the famous Chapel of St. John the Evangelist, which were completely stripped. The Jewel House contained the Regalia from the reign of Henry III. to 1664, when it was transferred to the Martin Tower, prior to final removal to the Wakefield Tower. The Jewel House was a two-storied building with embattlements, and was connected with Coldharbour Tower at one end and with the Queen's Lodgings or Royal Apartment at the other. The Salt Tower, which after the White Tower is the oldest portion of the whole palace-fortress, dates from the reign of William Rufus. In the eighteenth and early part of the nineteenth century it was used as a powder store, a purpose which rendered necessary the restoration in 1876 of the upper floor. The origin and reason of the name are lost in obscurity, but it is conjectured that it may have been used as a storehouse for saltpetre, from the considerable quantity of that commodity which was found in the vaults of the White Tower. The present Lantern Tower is a facsimile of the original by Salvin (1883), and is regarded as the best restoration within the T. of L. precincts. It is not known when this tower was destroyed, but Ainsworth writing in 1840 speaks of it as

having been 'long since destroyed' even in his day. Consult Lord Ronald Sutherland Gower, *The Tower of London* (2 vols.), 1902; Richard Davey, *The Tower of London*, 1910; Sir J. Younghusband, *A Short History of the Tower of London*, 1926; also Doynce C. Bell, *Notices of the Historic Persons Buried in the Chapel of St. Peter ad Vincula in the Tower of London (with an account of the discovery of the supposed remains of Queen Anne Boleyn)*, 1877.

Town Council, in England the governing body of a mun. bor. or co. bor. (see BOROUGH). Where the particular tn. is included in the co. area the co. council has overriding administrative powers in certain matters; but in the case of co. bors. the T. C. is practically independent of all other local governing authorities (see LOCAL GOVERNMENT). The T. C. consists of the mayor (*q.v.*), aldermen, and councillors. Membership of the council is restricted to persons enrolled, or entitled to be enrolled, as burgesses (*q.v.*). The councillors are elected for a period of three years, and one-third retire annually on Nov. 18 in each year and are eligible for re-election. Aldermen hold office for six years, one-half retiring on Nov. 9 triennially. The mayor is the civic head of the bor. and presides over the T. C., and is entitled to the courtesy title of 'worshipful,' and may be paid a salary. The mayors of Manchester, Liverpool, Birmingham, Bristol, York, and a few other large cities or tns. are Lord Mayors by letters patent. The rules of procedure provided by the Mun. Corporations Act, 1882 (2nd Schedule), must be observed. These provide for the holding of four quarterly meetings annually for general business. All acts of the council and all questions coming before the council are to be decided by a majority of such members as are present and vote, the whole number present, whether voting or not, to be not less than one-third of the whole membership—except when by-laws are to be made, when there must be two-thirds of the council present. Thus, if there are 36 members of the council and twelve only are present, nine of them could pass an effective resolution. Bor. councils usually meet monthly. The council can make standing orders for the regulation of their proceedings which may supplement statutory rules, but not be at variance with them.

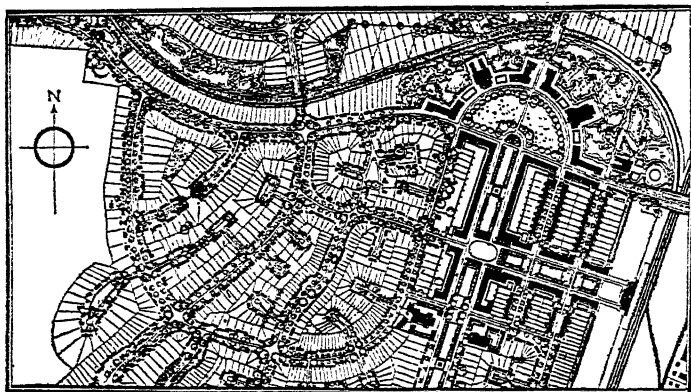
Towneley Plays, The, or Wakefield Mysteries, are thirty-two in number, and are believed to have been written in the fifteenth century by the friars of Widdikirk or Nostel. Like the York

plays, etc., the various 'pageants' together dealt with the whole Bible story. Some, like those of Noah and the shepherds, are purely comic, and the whole are remarkable for their humour and animation no less than for their coarse tone.

Town-Planning. T. P. (known as 'City Planning' in the U.S.A.) is the art of designing tns. and cities. It has been practised throughout the history of civilisation. It fell into desuetude when the need to plan tns. for purposes of military defence was no longer of paramount importance. When city walls ceased to be built, cities ceased to be planned, except where some ruler desired to beautify his capital or to facilitate his domination of it. A certain amount of partial planning has, however, always continued, and even in the eighteenth and nineteenth centuries estates were laid out by land-owners for building purposes, as may be seen, for instance, in the West End of London and in the cities of Bath and Edinburgh. No municipal authority had power to control the planning and extension of tns. except in a few instances where special powers had been secured by Act of Parliament. Powers existed in respect of sanitation, public health, and new buildings, but the first Act of Parliament to give T. P. powers to local authorities was the Housing and Town Planning Act of 1909. The Act was restricted to land 'likely to be used for building purposes.' The Act was amended in 1919 and again in 1923, and in 1925 the T. P. provisions were consolidated in the Town Planning Act of 1925 (see also under HOUSING). In 1931 the Labour Gov. introduced a Town and Country Planning Bill which included the provisions of the 1925 Act. This Bill passed through Standing Committee, but had not become law before that Parliament was dissolved. The National Gov. re-introduced the Bill with certain small amendments in Jan. 1932. The Ministry of Health (as was its predecessor, the old Local Gov. Board) is the responsible Gov. Department for T. P. The tn. and rural dist. authorities are responsible for carrying out the provisions of the Act. All land within the area of a local authority in the course of development or likely to be built upon may be planned. Land within the area of an adjoining local authority may be included if necessary for the completion of a particular scheme. Agricultural land may be planned for agricultural or recreational purposes to the extent necessary for planning neighbouring urban land. Areas of architectural, artistic, or historical

interest may be included in a T. P. scheme so that their character may be preserved. The procedure for T. P. is elaborate and is governed by the provisions of the Act and the Regulations issued by the Ministry of Health. The Ministry of Health have issued a set of model clauses containing the items usually included in a T. P. scheme. The model clauses provide chiefly for: reservation for routes for proposed roads; building lines; open spaces; regulations restricting special kinds of buildings (e.g. residential, commercial, industrial) to appropriate areas, limiting the heights of houses and buildings and the number of buildings per acre, controlling of advertisements; preservation of trees. The following

of the value of property due to the provisions of a scheme if they claim within a limited time. Appeals and disputes under the Act are decided by the Ministry of Health. T. P. was voluntary until the Act of 1919 was passed, when certain obligations were put upon the larger local authorities. Apart from provisions of public health and building Acts, landowners have been free to do as they liked with their own land. The principle that land must be devoted to the use to which it is best fitted in the interest of the community was first laid down in the Town Planning Act. It was a novel principle and has not yet been fully accepted. T. P. has therefore been somewhat limited by fears of liability to pay compensation, and



SECTION OF A TOWN-PLAN

matters may also be dealt with: retaining land in agricultural use; preserving buildings of special architectural or archaeological interest; drainage; water supply; lighting. The initiative for carrying out T. P. schemes rests with the owner of the land. The local authority has power to buy land for parks and roads. Compensation is payable by local authorities for property injuriously affected by restrictions imposed by a T. P. scheme, if the claim is made within a limited time. The owner must be able to prove that he is damaged by the restrictions; compensation is excluded in respect of provisions enforceable under public health or building Acts and under provisions of the scheme that prescribe the density, use, character and height of buildings. The local authority is entitled to half of any increment

efforts have been directed to secure the acquiescence of owners by arranging the plans to their general advantage. Many of the social and economic ills from which civilised people suffer are due to the wrong use of land: in particular to ill-placed houses; to factories built where they are too far from the means of transport or from sources of supply or from their employees or where their processes constitute a nuisance to the inhabitants and where there is no room for ancillary undertakings; rich food-producing land or beautiful countryside has been laid desolate by land speculators; buildings have been added to buildings and the cores of towns have become congested with traffic; settlements have been begun without adequate public services and on sites where such services cannot be provided except at great expense.

These are some of the economic disadvantages that the absence of T. P. has caused to fall upon the community.

Birmingham was the first city to take advantage of the Town Planning Act. Since 1919 local authorities have been able to form joint committees for the purpose of preparing regional plans. Experience has shown that the chief obstacles to T. P. were its restrictions to land 'likely to be used for building purposes,' and the machinery for adjusting compensation and betterment. These restrictions had been removed in several dists. by a series of local Acts, and proposed legislation is intended to remove them generally. Aviation is a planning factor which is receiving increasing attention and aerodrome sites are being reserved. At the end of 1931, 1021 schemes had been completed or were in hand by 632 local authorities dealing with about 7,197,626 acs., some 107 joint T. P. committees had been formed, of which forty-five were executive, covering about one-third of the country, and forty regional plans and reports had been pub. The Local Government Act, 1929, empowered co. councils to take part in planning, via joint T. P. committees, and this and the work of voluntary bodies has tended to direct planning more and more upon regional lines, with the primary object of preserving the identity of both tns. and country and preventing building from sprawling promiscuously over the countryside. Consult F. Haverfield, *Ancient Town-Planning*, 1913; T. H. Hughes and E. A. G. Lamborn, *Towns and Town-Planning, Ancient and Modern*, 1923; C. B. Purdom, *Town Theory and Practice*, 1921; Raymond Unwin, *Town-Planning in Practice*, 1919; C. B. Purdom, *The Building of Satellite Towns*, 1925; Nelson P. Lewis, *The Planning of the Modern City*, 1923; John Nolen, *City Planning*, 1916; T. K. Hubbard and K. McNamara, *Planning Information Up-to-Date*; Ministry of Health, *Model Clauses for Town-Planning Schemes*, 1928; *Reports of International Town-Planning Conferences* (International Federation for Housing and Town Planning, London).

Townsend, Meredith White (1831-1911). Eng. newspaper proprietor and man of letters, b. London and educated at Queen Elizabeth's Grammar School, Ipswich. At 16 he became an usher in a small Scottish school, but later went to Serampore, India, as asst. editor of *The Friend of India*, of which in 1852 he became editor and in 1853 proprietor. In 1859 he finally returned from India

on account of health, and in 1861 he bought *The Spectator* (q.v.), which he edited in conjunction with R. H. Hutton (q.v.) until the latter's death in 1897. Their joint editorship is historic in journalism, and a later editor, J. St. Loe Strachey, has said of T. that 'he was, in the matter of style, the greatest leader-writer who has ever appeared in the English Press.' In 1901 he pub. *Asia and Europe*, 'studies presenting the conclusions formed by the author in a long life devoted to the subject of the relations between Asia and Europe.'

Townshend, Charles, second Viscount (1674-1738), a statesman, played a part in supporting the Hanoverian succession, and on the accession of George I. was appointed Secretary of State for the Northern Department. He lost favour with the king in 1716, and was sent to Ireland in 1717, but was soon dismissed. In 1720 he was President of the Council under Stanhope, and on Stanhope's death (1721) became again Secretary of State, which office he held until 1730.

Townshend, Charles (1725-67), a statesman, entered parliament in 1747. He held the office of a Lord of the Admiralty for a short time in 1754-55, and was Secretary-at-War, 1761-63, and then went to the Board of Trade. He became Paymaster of the Forces in 1765, and in 1766, under Chatham, Chancellor of the Exchequer. He was a firm advocate of the Stamp Act, which lost the American colonies to England. He was an admirable orator, and the subject of one of Burke's most magnificent panegyrics. There is a biography, entitled *Charles Townshend, Wit and Statesman*, by Percy Fitzgerald, 1866.

Townshend, Sir Charles Vere Ferrers (1861-1924), British major-general; b. Feb. 21; son of Charles Thornton T., who was nephew to fourth Marquess Townshend. Entered Marines, 1881; at Abu Klea and Gubat, 1884-85. Indian army from 1886. As captain, led march to Chitral, Jan. 1895; commanded there during siege; made C.B. Back in Egypt, 1896; Dongola, Atbara, and Nile expedition, 1898. S. Africa, 1899-1900. Colonel, 1904. Brigadier-general, 1909. Major-general, 1911. In 1913, commanded brigade in India. In April 1915, appointed to command 6th Division in Mesopotamia. Proceeded from Basra over flooded country, with barges, reaching Amara, June 1. Captured Kut in Sept. Fought Nured-Din at Ctesiphon, Nov. 22; had to fall back on Kut; besieged there; surrendered April 29, 1916. In-

terned at Prinkipo till Oct. 1918. Made K.C.B. In 1920, pub. *My Campaign in Mesopotamia*. Independent M.P., Wrekin, 1920-22. Died in Hôtel d'Iéna, Paris, May 18. See KUT AL AMARA.

Township, or **Vill**, originally a group of allodial (see **TENURE**) proprietors united by community of agricultural interests, the chief officer of which was the town-reeve. Later the T. consisted of the tenants of some one great overlord vested with powers of local gov. under the supreme control of the overlord, who himself nominated the reeve. Under the Norman kings the T. became a manor and formed the nucleus of the mediæval borough. Each manor contained the demesne lands of the lord, a number of freehold tenements, villein tenures, and waste land for pasture. The term is not now in common use, but until recently meant legally a town containing more than one parishioner.

Townsville, a port of Queensland, Australia, is situated on the E. coast. It is the seat of an Anglican bishop. Pop. (1928) 30,700.

Towton, a par. in the W. Riding of Yorkshire, England. The scene of the Yorkist victory of 1461.

Toxæmia, blood poisoning from the presence of toxins (poisons) in the blood (see **PYÆMIA**).

Toxicology, the science dealing with poisons. Its main branches deal with the chemical nature of poisons, their origin and preparation; their physiological action and the tests by means of which their presence may be detected; the pathological changes due to their presence and the recognition of them by post-mortem evidences; their chemical reactions with a view to the determination of antidote and the physiological action of the latter. Since the time of Virchow, Pasteur, and others, the science has become much more intricate, chemotherapeutics being largely devoted to the discovery of toxins and antitoxins, which may be roughly described as the poisons excreted by bacteria and those which are antidotes, either in a chemical sense or as poisons for the bacteria. This subject views the matter as warfare between germs and the cells of living creatures, carried on largely by means of excreted poisons. The investigation tends to assume the form of research into the molecular structure of the chemical concern. See **POISONS**.

Toyama, a tn. of Hondo, Japan, an important trade centre. Pop. (1925) 67,490.

Toynbee, Arnold (1852-83), an Eng. economist and social reformer, b. in London. He was intended first for the army and then for the Bar,

but ill-health and literary activity prevented the following of either of these professions. He went to Oxford and finally gave himself up to the study of social and economic questions. He also did much practical work for the betterment of industrial conditions. In 1875 he went to Whitechapel, where he joined in work with Canon Barnett. He d. of overstrain. See **MONOGRAPHS** by F. C. Montague (1889) and Milner (1901).

Toynbee, Paget, Eng. philologist, b. Wimbledon, Jan. 20, 1855. Educated Haileybury, Balliol College, Oxford. He is a leading authority on Dante, having edited *inter alia* critical texts of the *Divina Commedia* (1900) and of Dante's *Letters* (1912-17); also written *Life of Dante* (1900). Has edited books in connection with Horace Walpole (*Horace Walpole's Reminiscences*, 1924, etc.).

Toynbee Hall, Whitechapel, was the first University Settlement, and was founded by Canon Barnett, rector of St. Jude's, Whitechapel. Canon Barnett, believing in the essential brotherhood of men, was shocked and horrified at the degradation and wretchedness of slum life in the East End contrasted with the luxury of the West. Relying on the innate generosity of youth, he determined to confront young men and women who had enjoyed the privilege of university life with the horrors of existence in the E. of London. He therefore collected together a number of young men from Oxford and Cambridge, among whom was the most ardent Arnold Toynbee, to work with him in his dist. After Toynbee's early death Canon Barnett founded a University Settlement—that is, a house where university men may reside in an industrial area—and named it after his brilliant colleague who had d. from excess of unselfishness and social zeal. The first residents at Toynbee Hall concerned themselves with the improvement of local gov., social conditions, and education; gave free legal advice, arranged children's holidays, and so forth. The aim was, and still is, to provide in the poorest dists. those elements of satisfactory life—including the love of music, pictures, and literature—which are the natural possession of educated men and women. Results of the work, in addition to its influence in inspiring social legislation, may be seen in the Children's Country Holiday Fund, in the Whitechapel Art Gallery, and above all in the many settlements of the Toynbee Hall type founded in Great Britain and the U.S.A.

Toys, implying, in a general sense, children's playthings. T. can be traced back to very remote periods.

The top is mentioned in Virgil in the seventh *Aeneid*, and was probably introduced into England by the Romans. The Gks. appear to have played with different kinds of ball: the little ball, the great ball, and the empty ball, which was blown out like the modern football. There is a fine collection of early Rom. dolls in the Musée du Louvre, Paris, of which a description is given in *Histoire des Jouets*, by H. R. d'Allemagne (Paris, 1903), and deals very fully with *les poupées* of different periods.

Trachea, or Windpipe, the air tube which leads from the larynx to the bronchi. It is about $4\frac{1}{2}$ in. long, and is made up of fibro-elastic membrane enclosing cartilaginous rings about $\frac{1}{2}$ in. in diameter. The interior consists of coatings of submucous tissue and ciliated epithelium. The trachea begins at the larynx and proceeds downwards in front of the oesophagus until it bifurcates into the two bronchi. The trachea is sometimes the seat of inflammation through the impaction of foreign bodies. In such cases the removal of the body is attended with a certain risk, but as the danger of respiratory obstruction is usually greater if the condition be allowed to persist, removal should be attempted with every preparation for the operation of tracheotomy.

Tracheotomy consists of cutting into the windpipe above or below the isthmus of the thyroid gland. A curved tube is inserted into the orifice, and by this means breathing is carried on. The operation is called for when the upper respiratory passages are obstructed by foreign bodies or morbid growths, as in diphtheria.

Trachonitis, a district of anct. Palestine, corresponding to the modern Lejā. It lies S. of Damascus, E. of Aulanitis and N. of Batanea, in Bashan. In A.D. 37 Herod I., king of Judea, received the tetrarchy of Batanea and T. from Caligula.

Trachyte. The Ts. form the volcanic type of the sub-acid igneous rocks. Characteristic minerals are orthoclase and hornblende, the felspar occurring usually as sanidine (with Carlsbad twinning). The Ts. are named after their most conspicuous mineral, thus: sanidine T., hornblende T., etc. The leucitophyes and phonolites are trachytic rocks containing leucite and nepheline respectively. Trachytic rocks are found in Cornwall, Had-dington, Auvergne, and Hungary.

Track and Field Sports. This term is applied in the U.S.A. to all kinds of flat and hurdle foot-racing, broad and pole jumping, and throwing of weights, discus and javelin. One of the greatest organisations which arrange contests

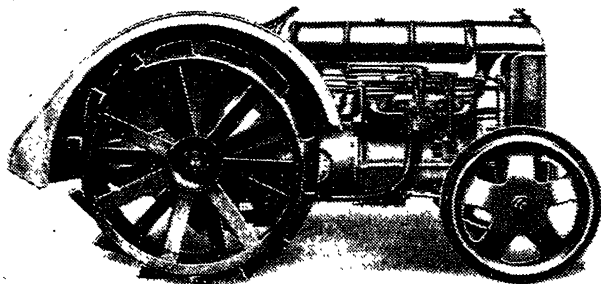
is the Inter-collegiate Association of Amateur Athletics, to which about fifty American colleges belong. It has matches in outdoor sports every May and indoor sports usually in March. Apart from the colleges, the largest body is the Amateur Athletic Association, but there are many other smaller ones. It is largely due to the keenness engendered by these organisations that American athletes hold their present place in the world's records and in the Olympic Games.

Tractarianism, a name once commonly given to the movement now better known as the Oxford or Catholic Movement, which arose about 1833 in the Church of England. It was so called because its propaganda was carried on largely through the series of *Tracts for the Times*, of which ninety were published. See OXFORD MOVEMENT, PUSEY, etc.

Tractors. The name T. is given to a type of small mobile power-unit employed for haulage, farm work, etc. It is generally engine by an internal-combustion engine using petrol, paraffin, or heavy oil, which drives the road wheels through gears and a differential. Sometimes for the larger varieties a steam engine is employed as the prime mover and occasionally for special work a T. may be electrically driven. Ts. fall into two classes, viz. those having wheels and those propelled by a caterpillar track. In the former, the wheel-base is extremely short and the rear wheels, through which the drive is taken, carry steel 'spuds' riveted on the outside circumference to assist them to grip when traversing rough ground. When travelling over metalled roads, Ts. with wheels of this type have narrow steel hoops fitted over the spuds so that the movement on the hard surface is smooth and the road is not damaged. The front wheels are made to steer and are of smaller diameter than the rear ones. A caterpillar track consists of an endless chain of steel links driven by a toothed wheel or sprocket. The outer faces of the links which are in contact with the ground are specially shaped to ensure a good grip, and the inner surface forms a flat track on which roll the bogie wheels fastened to, and carrying the weight of, the body. The usual method of steering tracked vehicles is by skidding, that is, by braking one track and driving the other, the effect being to drive the T. towards the side which is being held stationary. Sometimes a differential gear is not fitted in the final drive to the sprockets, a solid cross-shaft driven from the propeller shaft by bevel-gearing being used instead.

A clutch is provided on each side so that, as the brake is put on one side, the track on that side is automatically de-clutched and all the power is given to the opposite track. An epicyclic gear is also occasionally fitted to assist in the steering. The caterpillar track possesses an advantage over the ordinary wheels in that, by good design, a T. so equipped can work on marshy ground because of

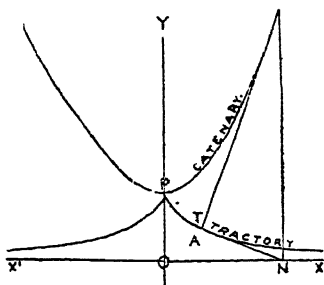
Tractory, or Tractrix, the curve traced by a heavy particle dragged by an inelastic string attached to a point moving in a straight line. It is represented in the figure, where its evolute, the catenary, is also shown. Tangents intercepted between the curve and the x -axis are of equal length. If a point P be taken on the curve, its co-ordinates being x, y , then the arc $AP = a \log_e a/y$, area =



A FORDSON AGRICULTURAL TRACTOR

the low pressure between the tracks and the ground. In farm work the T. is used to replace horses and by pulling three or four ploughshares at once enables a greater acreage to be worked in a given time. This is an important advantage, particularly in a country where climatic conditions are uncertain, because a T. gets the work done quickly when the weather is suitable. Most Ts. are fitted with a belt pulley which can be used for driving a circular-saw, threshing machine, etc. Ts. are also much used nowadays in road construction for moving stones and soil from one part of the work to another, driving the concrete-mixer, removing tree stumps, etc., and in the motor transport world they are used in combination with trailers. At large aerodromes they have been found convenient for moving air-liners from their hangars, whilst modern armies use them extensively, particularly for the haulage of guns and ammunition. Consult Page, *The Modern Gas Tractor*; *Tractor Trials held at Lincoln* (Society of Motor Manufacturers and Traders); *Manual of Military Vehicles*, 1930 (H.M. Stationery Office). See also TANKS.

$a^2 \sin^{-1} y/a$. The curve is asymptotic to xx_1 , and a circle with radius equal to the tangent has an area equal to



the total area included in the four branches of the curve symmetrically disposed to the axis.

Tract Societies, societies designed for the publishing and distribution of religious pamphlets and books, intended to reach the mass of the people. The Society for Promoting Christian Knowledge (*q.v.*), founded

1701, had this object, as had also the undenominational Society for Promoting Religious Knowledge among the Poor (1750). The greatest, however, of such societies is the Religious Tract Society (*q.v.*), founded in 1799 by the Rev. George Burder, which has proved a useful auxiliary to the various missionary societies. Its publications appear in over 250 different languages.

Trade. From about 1607 England adopted a coherent if erroneous science of commerce—the celebrated doctrine of *The Balance of Trade*. In accordance with this doctrine it was assumed that an excess of exports over imports was 'the sole criterion by which the relative position of the country, as to wealth, should be judged,' and it was further held that the excess of the value of imports over exports could be balanced in no other way than by the importation of an equal value in gold and silver (Webster, *The Trade of the World*). During the thirteenth century, England's foreign T. consisted mainly in wool, wine, herrings, and cloth. The ordinances of the staple were very naturally designed to maintain a high price for wool exported, and there was appointed thus early in our commercial history a body of customs collectors in all the ports. Wine was mainly imported, though some was home grown; the principal object of regulation, even fifty years earlier than Edward III., was that it should be obtained by consumers on the easiest terms possible, and hence the privileges accorded to the Gascony merchants by Edward I. excited the hostility of the City of London merchants. At this period the middleman was anathema as well to the legislature as to the consumer; and ordinances were framed against 'forestalling' or 'engrossing.' But with the increasing complexity of commerce it was soon found to be impracticable to attempt to interfere with middlemen, whether in the interests of the producer or the consumer. Perhaps the most striking institution in regard to T. in the Middle Ages was that of the craft-gilds, an institution which did more than any other during these earlier times to co-ordinate and regulate T., not only in England, but on the Continent—whence, indeed, the institution was imported (*see also* TRADE UNIONS). The principal effect of the gilds on T. was that, by regulating apprenticeship and insisting on a high quality of manufacture, they, by their own material prosperity, not only reacted upon the growth of towns, but themselves became identified with the municipal or controlling authority, although in

another direction they *checked* the expansion of T. by their exclusiveness. The geographical discoveries of the fifteenth century expanded the area of commerce, and the supersession of *municipal* or *civic* by *national* life gave rise to schemes for economic progress in various European countries. The importance of these schemes lies in the fact that they opened out the way to investment of capital, and by so doing introduced an antidote to the artificial restrictions on T. expansion imposed by the gilds. The principal events in the history of Eng. T. in the reign of Elizabeth were: (1) the systematic development of Eng. maritime power; (2) the immigration of skilled labour through Burleigh's grants of patents for new enterprises, and the consequent introduction of new industries by capitalists; (3) the establishment of plantations abroad, notably in America; and (4) the introduction of banking and insurance. Another significant feature of the changing times was the fact that capital was sunk in land, so as to make it commercially profitable, whereas previously tillage was practised for subsistence, not for profit. The differentiation between employer and employed, notably in the spinning T. of the west of England, was the direct outcome of the fact that the capitalist employer was in a superior position for superintending workmen, introducing labour-saving devices, and finding the most profitable market. The Whigs during their political ascendancy under Walpole directly encouraged the introduction of non-indigenous Ts., but the domestic system offered but little in the way of a solution of the cardinal difficulty—the dearth of materials in the established manufactures. Capital everywhere promoted T. by finding the necessary materials, fostering skilled immigrant labour, and making a market. Perhaps the revolt and severance of the American colonies was the best antidote to the short-sightedness of the British commercial system, for that system was fashioned solely in the interests of Eng. industry, and conversely hampered and repressed colonial industries in every direction (*see* on this Cunningham, section xvii., subject, *Mercantile System*). For British commercial policy during the last hundred and twenty years, *see* under FREE TRADE; PROTECTION; TARIFF; and TARIFF REFORM; and for the most recent statistics of British foreign trade *see* under MERCANTILE MARINE and *infra*. In earlier times T. received its chief impetus through the difference in the

skill and culture of races. But with the passing of the centuries this difference has tended to disappear. For example, the one-time advantage that Ger. T. possessed in her superior science and craft is less apparent to-day because other countries, especially America, Japan, and Great Britain, have copied and sometimes improved upon Germany's ideas. A much more important cause is the difference in the stage of industrial development. Thus a people sparsely occupying large agricultural territory naturally exchange food commodities for manufactured goods from industrial areas. Further, differences in natural resources supply another cause of T. Foreign T. appears to be least important in large countries like China and most important in small countries like Uruguay, which, producing practically only food commodities, requires from other countries the supply of all her other needs. The Falkland Islands is another example. The *per capita* T. of that area is nearly seventy times that of the U.S.A.

The following statistical tables show the principal movements of T. for the United Kingdom and the value of T. carried on in foreign countries.

It will be noticed from the following table, that while the volume of T. is greatly increased, an adverse balance of T., i.e. excess of imports over exports, in all countries except S. Africa and India, is revealed. The table is taken from the *Board of Trade Journal*. For the first nine months of 1931 Great Britain imports aggregated £621,352,649, showing a reduction of £163,675,245 on the same period during 1930. The chief commodities showing the decline were as follows: Grain and flour £14,103,874; meat £15,295,319; wood and timber £10,567,388; raw cotton and cotton waste £15,113,020; oils, fats, and resins, manufactured, £15,563,796. Exports for the same period of 1931 reached £292,390,601, a reduction of £148,724,730 on the same period of 1930. Chief declines were shown in the following classes: cotton yarns and manufactures £28,635,509; coal £9,334,997; iron and steel manufactures £17,845,114; machinery £11,640,055; woollen and worsted yarns and manufactures £9,888,978; vehicles, including locomotives, ships, and aircraft £13,472,695. In 1930 the gov. established an Economic Advisory Council to make a study of developments in world T. with a bearing upon the prosperity of the country; while special Trade Missions have been formed for the purpose of linking up various industries. The decline in trade is by no means con-

IMPORTS OF GREAT BRITAIN FROM THE DOMINIONS AND FOREIGN COUNTRIES IN 1913, 1929, AND 1930.

Year.	Total.	Australia.	Canada.	N. Zealand.	S. Africa.	India.	U.S.A.	France.	Germany.	Russia.
1913	£ 798,734,739	£ 38,065,250	£ 30,438,374	£ 20,338,057	£ 12,301,429	£ 48,420,490	£ 141,052,072	£ 40,352,718	£ 80,411,057	£ 40,280,539
1929	1,220,766,300	55,048,007	46,410,075	47,726,567	24,308,747	62,844,796	196,970,919	56,540,289	68,817,086	26,447,400
1930, Jan. to Sept.	} 785,193,510	35,053,490	28,046,000	38,363,288	14,728,512	36,903,793	112,306,387	37,461,815	47,803,748	19,640,574

EXPORTS OF GREAT BRITAIN TO THE DOMINIONS AND FOREIGN COUNTRIES IN 1913, 1929, AND 1930.										
1913	£ 626,253,505	£ 34,471,260	£ 23,794,035	£ 10,837,087	£ 22,184,818	£ 70,278,221	£ 20,204,579	£ 28,033,072	£ 40,877,370	£ 18,102,083
1929	720,340,322	54,235,261	35,007,873	21,393,411	32,536,441	78,227,208	45,558,153	31,063,321	36,966,791	3,743,489
1930, Jan. to Sept.	} 441,116,331	20,321,647	21,700,186	14,037,720	20,170,345	43,245,743	21,960,045	22,273,453	20,448,970	5,029,598

Country.	Declared values of special imports.			Declared values of special exports.		
	1929. £	1930. £	Decrease per cent.	1929. £	1930. £	Decrease per cent.
United Kingdom . . .	1111.1	957.9	13.8	729.4	570.6	21.8
Australia . . .	145.2	94.4	35.0	123.1	91.3	25.8
Canada . . .	266.8	207.1	22.4	243.0	182.6	25.1
India . . .	193.3	145.0	25.0	238.9	189.5	20.7
Malaya . . .	96.0	77.3	19.7	100.0	71.8	28.2
Belgium . . .	202.4	176.7	12.7	181.5	150.0	17.4
Czechoslovakia . . .	121.6	95.5	21.5	124.0	106.4	14.8
Denmark * . . .	98.8	95.1	3.7	89.0	83.6	6.1
France . . .	468.8	421.5	10.1	403.7	344.8	14.6
Germany . . .	658.2	508.7	22.7	659.9	589.1	10.7
Italy . . .	234.3	187.7	19.9	164.8	137.1	20.4
Japan * . . .	226.7	158.0	30.3	215.5	146.9	31.8
Netherlands . . .	227.3	199.7	12.1	164.3	141.9	13.6
Sweden . . .	98.2	90.7	7.6	99.8	85.1	14.7
Switzerland . . .	106.0	100.2	5.5	82.3	69.2	15.9
U.S.A. * . . .	903.9	628.9	30.4	1059.6	777.0	26.7
Others . . .	910.7	778.7	14.5	1035.5	845.8	18.3
Totals . . .	6069.3	4923.1	18.9	5715.2	4576.1	19.9

* = total imports.

financed, however, to Great Britain, and the foregoing table illustrates the reduction in value of world trade in the countries mentioned, conversion being made to sterling at par. The figures are in millions of £s.

The extent of world T. in 1930 as revealed by imports and exports figures is shown in the table in the following column.

Consult Chisholm, *Handbook of Commercial Geography*, 11th ed., 1928; Smith, *Industry and Commerce*, 1925; *Board of Trade Journal*, Annual Statement of Trade, Navigation Accounts.

Trade, Board of, see BOARD.

Trade Boards are statutory bodies established under the Trade Boards Acts, 1909 and 1919. They form part of the negotiating machinery in the settlement of industrial disputes, especially wage claims, and arise out of the Arbitration Boards set up prior to 1909 to settle disputes where collective bargaining failed to produce agreement between employers and workers. By the Act of 1909 T. Bs. were instituted in four trades whose conditions of pay were very low. They were constituted of representatives of workpeople and employers with a neutral addition. The chief object of the T. Bs. was to prevent sweating, especially in home and factory work (see SWEATING SYSTEM), since these particular

Country.	Imports. Millions of £s.	Exports. Millions of £s.
Afghanistan	1.750	2.25
Albania	.350	.125
Argentina . . .	180	190
Austria . . .	80	55
Belgium . . .	176.7	150
Brazil . . .	54	66
China . . .	168	135
Czechoslovakia . . .	95.5	106.4
Denmark . . .	95.1	83
Egypt . . .	48	32
France . . .	421.5	344.5
Germany . . .	508.7	589.1
Greece . . .	29	16
Hungary . . .	23	30
Iraq . . .	17	12.5
Italy . . .	187.7	131.1
Netherlands . . .	199.7	141.9
Norway . . .	50	32
Poland . . .	55	60
Portugal . . .	24	10
Russia . . .	106	102
Spain . . .	100	85
Switzerland . . .	100.2	69
Turkey . . .	242	193
U.S.A. . . .	628.9	777
S. Africa . . .	83	83
Australia . . .	131	125
Canada . . .	185	160
N. Zealand . . .	43	45

workers were not sufficiently organised to protect themselves from exploitation. There are 44 T. Bs. to-day dealing with 39 trades, and over a million and a half workers are affected by their organisation. Their main function to-day is to fix minimum rates of wages in certain specified trades; such rates, when confirmed by the Ministry of Labour, are enforceable at law. A T. B. consists of members representing employers and workers in equal numbers, together with a number, almost invariably three, of independent persons known as Appointed Members, one of whom acts as chairman. Women as well as men are eligible for appointment, and in the case of T. Bs. for trades in which women are largely employed it is necessary for at least one of the Appointed Members to be a woman. Members normally hold office for two years. A T. B. must fix minimum rates for time work and may also fix other minimum rates, such as general minimum piece rates, special minimum piece rates, guaranteed time rate, overtime rates, etc. The deliberations of a T. B. upon a question of wages are regulated by the rate the trade itself can economically afford, and such rates can be enforced by inspection and by recourse to law. Although limited to a considerable extent in their functions, T. Bs. have proved an efficient means of improving conditions in many depressed trades. See also ARBITRATION; CONCILIATION IN INDUSTRY.

Trade Corporation, see CORPORATION.

Trade Disputes Acts. These Acts seek to define (1) what a trade dispute is in the legal sense; (2) the legal position of persons involved in the dispute, and (3) the degree of legal protection persons affected, especially by consequent intimidation or coercion, may claim. Strikes are not illegal *per se* at common law, but such Acts as the Conspiracy and Protection of Property Act, 1875, imposed penalties on combinations, whether of masters or workmen, which resulted in depriving the public of such essentials as gas and water. Various other statutes were passed up to 1875, when the legal position was consolidated under the Combination Act of that year. It was not, however, until the Trade Disputes Act of 1906 that complete statutory immunity from civil and criminal liability was provided with respect to strike action. Other Acts followed, designed to clear the position regarding breach of contract consequent upon 'sympathetic' strikes, and in 1927, following the

General Strike of 1926, new restrictions upon strike action, picketing, and sympathetic strikes were embodied in the Trade Disputes and Trade Unions Act (1927). The Act provides that any 'strike having any object other than, or in addition to, the furtherance of a trade dispute within the trade or industry in which the strikers are engaged is to be unlawful, if it is designed and calculated to coerce the gov., either directly or by inflicting hardship upon the community.' The Act also provides that a lock-out is illegal if it comes under the same category. The Act further provides that picketing is to be deemed unlawful if the picket attend in such numbers or such manner as to intimidate any person. It will be seen that the Act possesses very wide powers, and no doubt it aimed at preventing a recurrence of a strike of similar magnitude to that of 1926.

Trade Facilities Acts. The economic and industrial depression of 1921 involved producers in great difficulty in finding sufficient capital either for the extension of business or for new ventures. In order to assist those who were unable to borrow capital in the ordinary way, owing to the stringency of supplies of money, a Trade Facilities Act was passed in 1921 whereby the Treasury guaranteed such loans under certain conditions. A limit of £25,000,000 was made, but this sum was soon exhausted, with many *bona-fide* applicants still anxious to take advantage of the gov.'s offer. Accordingly in 1926 a further Act was passed raising the limit to £75,000,000, the operation of the Act to expire in 1927. Most of the money thus raised was employed in shipping and railroad schemes. The acute shortage of capital available for schemes of development overseas brought about a Trade Facilities Act in 1924 by which loans were guaranteed up to three-quarters of their amount for the purpose of extending public utility ventures and expansion. The Sudan, Western Australia, and Newfoundland were the principal areas to benefit, and railroad extension was the chief work to which the money was applied. The Treasury did not lend the money; it acted only as guarantor.

Trade Marks and Trade Names. The Trade Mark Act, 1905, defines a T. M. as 'a mark used, or proposed to be used, upon or in connection with goods, for the purpose of indicating that they are the goods of the proprietor of such T. M. by virtue of manufacture, selection, certification, dealing with, or offering for sale,' and includes in the term 'mark,' a 'device, brand, heading, label,

ticket, name, signature, word, letter, numeral, or any combination thereof. A T. M. is not, like a design, a species of incorporeal property in which a man can obtain copyright, but its practical effect is the same as soon as it is applied to the goods he sells, for, assuming the mark to be distinctive, a rival trader could at once be restrained by injunction from applying a similar mark to his goods upon the broad ground that he would thereby be inducing purchasers to think that his goods were those of another person. In short, a T. M. denotes the *producer* of a thing, and not the *thing produced*, and in that respect differs from a 'trade name,' the object of which, being in reality an advertisement of the *character* and *quality* of the goods, may be attained by describing either maker or article or both. To be valid as a T. M., the mark chosen need not have any meaning, but whatever it is, it must be distinctive in the sense that it is adapted to distinguish the goods of the proprietor of the mark from those of other traders before it will be registered by the Registrar. (The Registrar's address is: The Registrar, Patent Office, Trade Marks Branch, 25 Southampton Buildings, London.) No mark will be registered unless it contains at least one of the following 'essential particulars': (1) The name of a company, individual, or firm represented in a special or particular manner (called 'name marks'). But one trader cannot, by virtue of registration under the Act of 1905, obtain the right to prevent another trader honestly describing his own goods by his own name. (2) The signature of the applicant for registration or some predecessor in his business. It is highly inadvisable from a commercial point of view to adopt a signature T. M. Ordinary customers can hardly read or remember them, and, moreover, they afford little protection against traders with similar initials. (3) An invented word or words (called 'word marks'). These are very popular as T. Ms., for, in the words of a high authority, while in many of the classes all, or almost all, the suitable devices are either already appropriated or have ceased to be distinctive, the number of new words which may be invented is practically unlimited. (4) A word or words having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or surname. Under the analogous clause in the old Act of 1885, *Apollinaris* as applied to mineral waters, *Uneda* to biscuits, were held to be such as had reference

to character or quality. *Kynile* for explosives, *Trilby* for blouses, and *Mazawattee* for tea were held to have no reference to character or quality and therefore to be within the protection of the clause. The whole object of the drafting of the clause in so guarded a manner is to prevent ordinary Eng. words from being registered so as to deprive the public from employing them in their ordinary meaning. (5) Any other distinctive mark but a name, signature, or word or words, other than such as fall within the descriptions in 1, 2, 3, and 4 (*supra*), shall not, except by order of the Board of Trade or the court, be deemed a distinctive mark. But any special or distinctive word, letters, etc., used as a T. M. by the applicant or his business-predecessors prior to Aug. 13, 1875, which has continued in use without substantial alteration down to the date of the application for registration will be registered under the Act of 1905 (i.e. irrespective of its failing to satisfy any of the 'essential particulars' above noted). T. Ms. must be affixed in some way to the articles sold and thus again differ from a 'trade name' (which must not be confused with a 'name mark'). In case of infringement, the injured party may choose between damages or having an account taken of profits. Registration is a condition precedent to the right to sue. In regard to *trade names* the law merely recognises a person's right to prevent others from personating his business by using any such description as would lead customers to confuse his goods with those of a trade rival. The registration of T. Ms. is governed by the T. Ms. Acts, 1905 and 1919, and the T. Ms. Rules of 1920 and 1925. The Act of 1905 continued the system of registration then in use, and T. Ms. already registered and those which may be registered under that Act are recorded on the 'A' part of the register, while on the 'B' part are T. Ms. allowed under the Act of 1917 to be registered after two years' *bona-fide* user; but a mark may be registered by the same proprietor in both parts. The rules as to registration in the 'A' class are stricter than for 'B' marks, and confer higher rights; for registration under 'A', if valid, gives exclusive rights to the mark; that under 'B' is merely *prima facie* evidence of such right, and proof that a rival mark is not such as to deceive is a good defence. Unregistered T. Ms. are those which are recognised by the common law. Special legislation exists for the protection of the Red Cross mark or the words 'Red Cross' (Geneva Convention Act, 1911),

the word 'Anzac' (*q.v.*) (The Anzac (Restriction on Trade Use of Word) Act, 1916), and the words 'Port' and 'Madeira' (Anglo-Portuguese Commercial Treaty Acts, 1914 and 1916). The use of a T. M. is voluntary, but in certain cases the manufacturer is compelled to stamp on goods a specified distinctive mark. Of such goods, gold and silver plate has, from the fifteenth century, been the most familiar example, and the most recent are imported watch cases, under an Act of 1907. Others are anchors and chain cables; butter, cheeses, and margarine (under the Food and Drugs (Adulteration) Act, 1928); gun barrels, under an Act of 1868; and gunpowder, under an Act of 1875. Buyers and sellers in good faith of marked goods are protected by various provisions in the Merchandise Acts, 1887 to 1926. (*See also* MERCHANDISE MARKS.) There are special provisions relating to false marking of particular goods such as linen, cutlery, dyed goods, and metal buttons.

The Registration of Business Names Act, 1916, and the Business Names Rules, 1917 and 1926 (made under the Act), provide for the registration of firms and individuals who carry on trade under a name other than their true name. Associations incorporated by Royal Charter now receive protection for their names and uniforms by the provisions of the Chartered Associations (Protection of Names and Uniforms) Act, 1926. Such associations as Boy Scouts, Girl Guides, and the Order of St. John of Jerusalem also receive the benefit of this Act by Order in Council.

Trade Organisation, *see* CHAMBERS OF COMMERCE; COMMERCIAL INTELLIGENCE DEPARTMENT; OVERSEAS TRADE, DEPARTMENT OF; COMMERCIAL TRAVELLER; *also* TRADE PROTECTION SOCIETIES, ASSOCIATION OF; TRADERS' DEFENCE ASSOCIATIONS; *also* EXHIBITIONS.

Trade Protection Societies, Association of. This association was founded in 1848 for the purpose of protecting and developing the trade of the United Kingdom, furthering the interests of commerce by promoting Bills in parliament, or opposing such Bills as might be injurious to trade, and generally of assisting the commercial community. The affairs of the association are managed by an elective committee. Over 100 societies, representative of all branches of trade, are affiliated to the association.

Traders' Defence Associations. These associations, which exist both in England and Scotland, were founded with the object of defending the interests of private traders or companies against (1) governmental and

municipal interference in the form of burdensome taxation, oppressive inspection, etc., and (2) the trading activities of co-operative societies and of municipal bodies.

Tradescant, John (*d.* 1637), a naturalist, is most probably the author of an Ashmole MS. which describes a voyage round the North Cape to Archangel undertaken by Sir Dudley Digges, a MS. which contains the earliest account extant of Russian plants. He took part in the expedition against the Algerine pirates (1620), and brought back the 'Alger apricot.' His son, *John Tradescant* (1608-82), made a collection of flowers, plants, and shells, which he bestowed on Elias Ashmole, who presented it to Oxford University (1682). He pub. *Museum Tradescantianum*, 1656. He introduced, with his father, the lilac, acacia, and occidental plane. Both father and son were in the employment of the Duke of Buckingham and, later, of King Charles I., as gardeners.

Trades Union Congress. The T. U. C. was instituted in 1868, and meets once a year as an industrial conference representative of most of the trade unions (about 80 per cent.). Any *bona-fide* trade union may apply for membership of the affiliation to the Congress, and delegates are appointed in the proportion of one to every 5000 members. The Congress has no authority to enforce its decisions upon any union, its recommendations operating upon the principle of counsel and consent. In 1900 it created its own political party. In 1924 its programme included the improvement of economic and social conditions of workers, public ownership and control of natural resources, including land, mines, and railways, and the extension of state and mun. enterprise for the provision of social necessities and service. Among the measures it supports are a legal minimum wage for each industry, a legal maximum working week of forty-four hours, provision and training for unemployed, adequate housing, and compensation for industrial accidents and diseases, and pensions for the aged, widows, and children. In 1920 a General Council was created which became the centre of the organised workers' movement. It is elected by the Congress and holds office for one year. There are seventeen groups of unions affiliated to the Congress, as follows, the number in parentheses indicating seats on the General Council: 1. Mining and Quarrying (3); 2. Railways (3); 3. Transport (2); 4. Shipbuilding (1); 5. Engineering (3); 6. Iron and Steel and Metal trades (2); 7. Building (2);

8. Printing (1); 9. Cotton (2); 10. Textiles (1); 11. Clothing (1); 12. Leather (1); 13. Glass, Pottery, etc. (1); 14. Agriculture (1); 15. Public employees (1); 16. Non-manual workers (1); 17. General workers (4). The T. U. C. is affiliated to the International Federation of Trade Unions and supports the work of the International Labour Office (*q.v.*), sending a delegate each year. It co-operates politically with the Parliamentary Labour Party, and consists to-day of nearly six hundred delegates. It has a Research and Information Department and a Publicity Department, and produces a Bulletin and a monthly magazine. Its membership (1931) was 3,719,410. See A. Creech Jones, *Trade Unionism To-day*, 1927; C. M. Lloyd, *Trade Unionism*, 1928.

Trade Unions. T. U. are associations of employed workers, formed primarily for the purpose of substituting collective for individual bargaining, though they act in many cases also as friendly societies, and take part in other activities related to their main purpose, such as politics and working-class education. T. U. existed in Great Britain long before the Industrial Revolution and were powerful and highly organised among the skilled crafts in the eighteenth century; but they owe their main social and economic importance to the rise of the modern factory system based on power-production. They exist in agriculture as well as in industry, but have never succeeded in taking deep root among rural workers. There are T. U. in all modern industrial countries, and the movement has already attained to some importance in Japan and India, as well as in Europe and America. Usually, the most important T. U. in each country are joined together in a Congress or Federation, such as the Trades Union Congress in Great Britain, which acts as their spokesman on matters of general concern. These national centres are for the most part linked up in the International Federation of Trade Unions, which has its headquarters at Amsterdam; and there are also International Federations of T. U. in many particular industries, such as the Transport Workers', Miners', Textile Workers', and Metal Workers' Internationals. There is also a rival Communist body, the Red International of Labour Unions, which derives its chief strength from the Soviet Union, but also includes dissident groups in a number of countries. The American Federation of Labour, which has a distinctive

attitude of its own, belongs to neither the I.F.T.U. nor the R.I.L.U.

The primary purpose of T. U. is collective bargaining, based ultimately on the right to strike. But the strike is, in fact, usually invoked only as a last resort. T. U. greatly prefer to settle questions by means of negotiation, either with employers singly or, more often nowadays, with highly-organised Employers' Associations or Federations. Such negotiation involves the 'recognition' of the T. U. by the employers; and in the earlier days of Trade Unionism there were many bitter struggles over the employers' refusal to recognise the right of collective bargaining, and workers were often locked out for the offence of belonging to a T. U., or attempting to use it as an instrument of negotiation. As recently as 1914, the British railway companies still refused to recognise the National Union of Railwaymen and the other railway T. U. There are still firms in Great Britain that refuse to deal with T. U.; and their number has probably increased a little during the past few years. But in the main British industries the T. U. battle for recognition has been for the most part won; and wages and conditions are regularly settled by collective bargaining. Far more questions are settled in this way than by means of strikes or lock-outs. The position, however, is by no means the same in all other countries. Apart from Russia, where Trade Unionism is very powerful, the only great country where the workers are as strongly organised as in Great Britain is Germany; and even there some trouble is caused by the separation of forces between the Social Democratic or 'Free' Unions, which include the main body of the workers, and the 'Christian' Unions associated with the Centre (Catholic) Party. In France, partly because there is more small-scale industry, Trade Unionism is far weaker; and there is a division of forces between the Confédération Générale du Travail and the smaller Communist C.G.T. Unitaire. In the U.S.A., Trade Unionism is strong only in a limited group of skilled trades, mostly federated in the American Federation of Labor; and the great majority of the workers are unorganised, many employers refusing not only to recognise T. U., but even to employ trade union members. The development of American law has put serious obstacles in the way of the movement; and the courts often grant 'injunctions' which forbid the Unions to undertake propaganda among the unorganised. In Italy, Fascism

broke up the old T. U. movement, and the Fascists have organised Unions of their own to replace it, under strong official control. In Japan also the movement has met with severe repression. It is fairly powerful in many of the smaller European countries, such as Belgium, Holland, Denmark and Sweden, and also latterly in Spain, where it includes a strong anarchist and syndicalist element. The movement achieved its legal emancipation first in Great Britain, where modern industrialism first developed on a large scale. Up to 1824 there were many statutes in existence forbidding working-class combination, either generally or in particular trades. The earliest general Act dates from the reign of Edward VI. General Acts prohibiting combination were passed in 1799 and 1800, when the British governing class was in fear of popular movements following on the Fr. Revolution of 1789 (incidentally, the Revolutionary Gov. in France also prohibited T. U., under the *Loi Chapelier* of 1791, and T. U. only received legal recognition in France in any full sense in 1884). The Eng. Combination Acts were repealed in 1824, after an agitation engineered by Francis Place and the Radicals; but stringent restrictions on T. U. activity were reimposed in 1825, and the T. U. only secured adequate legal recognition in 1871-75. Prohibitions and restrictions were, however, at no time successful in preventing working-class combinations, though they sometimes drove them underground, and many leaders were imprisoned for taking part in the work of organisation or attempting to apply collective bargaining. The history of British Trade Unionism falls, roughly, into seven periods. (1) During and before the eighteenth century Trade Unionism was for the most part confined to skilled craft-workers, organised in small local Trade Clubs which only linked up occasionally over a wider area. These Clubs were sometimes powerful, as they had a monopoly of skilled labour. Their main functions were to negotiate with employers (mostly small employers) about wages and hours, to enforce limitation of apprenticeship, and to act as friendly societies. Until 1813 the magistrates still had power, under the Elizabethan Statute of Artificers to regulate wages, and until 1814 to regulate apprenticeship; and often the object of the T. U. was the enforcement of the Elizabethan statute. These provisions were repealed in 1813 and 1814 under the influence of the new doctrines of *laissez-faire*. (2) From 1799 to 1824 Trade Unionism

was forbidden under the Combination Acts. It continued to exist, and in some trades to negotiate with the employers openly and without prosecution. But T. U. in the mining and textile trades were subject to severe repression, and unable to maintain a continuous existence, though new societies constantly sprang up in place of those which were dissolved. (3) The repeal of the Combination Acts in 1824 was followed by a great wave of T. U. activity, culminating in the formation of the Grand National Consolidated Trades Union, under Robert Owen's influence, in 1833. But this body was destroyed in the following year, after a great series of strikes and lock-outs, and after the famous 'Dorchester Labourers,' who had formed an agricultural branch, had been transported for the offence of administering unlawful oaths. (4) After 1834 the work of organisation began anew on less ambitious lines. General Unionism went out of fashion (though there was a revival of it in 1845-48), and attention was concentrated on building up stable unions in particular trades. The National Miners' Association (1841) came to grief; but from 1850 onwards powerful societies grew up, such as the Amalgamated Society of Engineers (1851), relying on high contributions and a mingling of industrial and friendly benefits to ensure stability of membership. This method was effective in organising skilled workers, but left unorganised the worse-paid workers, who could not afford the high contributions exacted. Under the moderate leadership of the new Amalgamated Societies of skilled workers the T. U. at length secured legal recognition under the Trade Union Act of 1871. This was at first combined with repressive measures against coercion and intimidation, under the Criminal Law Amendment Act of 1871; but the T. U., strengthened by the Reform Act of 1867, which gave the urban workers the vote, got this Act replaced by the milder Conspiracy and Protection of Property Act of 1875. During the very prosperous years between 1869 and 1874 there was another great wave of Trade Unionism, which spread to the less skilled workers and, under Joseph Arch's leadership, to the agricultural labourers. But in the middle 'seventies came a severe slump in trade, which largely destroyed the Unions' power. They were reduced to quiescence, until the revival of 1888-89. (5) The Miners' Federation was formed in 1883; and in the following year the London Dockers' strike was the beginning of a

big movement of agitation among the less-skilled workers. This period marks the revival of Socialist influence in the T. U., for the 'New Unionism' was largely organised and directed by Socialists. Under Socialist inspiration, the Unions not only began more and more to supplement collective bargaining with demands for industrial legislation—already a familiar policy among the miners and textile workers—but also to consider taking political action as an independent working-class party. Under Keir Hardie's leadership, the Socialist Independent Labour Party (1893) undertook a vigorous campaign with the object of bringing the T. U. into politics; and in 1900 the Trades Union Congress was persuaded to launch, in partnership with the Socialist bodies, the Labour Representation Committee, which in 1906 adopted the name 'Labour Party.'

(6) The progress of the L.R.C. was slow at first; but an important legal decision threatening the very existence of Trade Unionism rallied the T. U. movement behind it. This was the Taff Vale decision (1902), by which it was laid down that T. U. funds could be made liable for damage caused by a trade dispute. The agitation against this decision led to the winning of a large number of seats by the Labour Party in the General Election of 1906, and to the passing of the Trade Disputes Act (1906), which remedied the grievance. But immediately the T. U. suffered a further setback in the courts, the Osborne Judgment (1908) declaring political action by T. U. unlawful. Further agitation followed, until this grievance was in part remedied by the Trade Union Act of 1913. In the meantime, the failure of wages to rise with increasing prices and national wealth had led, in 1911 and the following years, to a great movement of unrest and strikes (transport workers 1911 and 1912, miners 1912), and to the emergence of new social theories such as Syndicalism and Guild Socialism, claiming a large share in the control of industry for the organised workers. This movement of unrest continued in being up to the outbreak of war in 1914.

(7) The war, after an initial setback, greatly increased the membership and power of the T. U., owing to the high demand for labour and the necessity of constant negotiations as prices rose and industrial methods had to be modified in face of war conditions. The Unions emerged from the war, with doubled membership, into a period of acute unrest. There were many big strikes between 1919 and 1921, when the coming of the great

post-war depression seriously limited T. U. power. But politically the strength of the Labour Party went on growing; and a minority Labour Gov. came to office for a brief period in 1924. The fall of this Gov. was followed by a renewal of industrial strife, culminating in the miners' lock-out and the General Strike of 1926, when the Trades Union Congress organised a national strike movement in support of the miners' claim to a living wage. The defeat of the General Strike, which was a perfectly orderly movement, was followed by the Trade Disputes and Trade Unions Act of 1927, which not only declared general and sympathetic strikes to be illegal, but also withdrew many of the privileges gained by the T. U. under previous Acts, and left the law in a condition of dangerous ambiguity on many vital matters. A second Labour Gov. held office, in a minority, from 1929 to 1931, when it fell as a result of the financial crisis arising out of the world slump. Meanwhile, in the industrial field, the T. U. remained perforce on the defensive, owing to the general depression. Their membership had fallen heavily since the years of boom after the war; and their power was being further menaced by the decline of the older industries, in which their strength mainly lay, and the rise of new mechanical trades operated more largely with unskilled labour.

There is no space in this article to relate the history of the T. U. movement in other countries. We must turn instead to describe its organisation and working. The modern T. U. is usually a national body, with branches scattered wide over a whole country. Its branch officers are actual workers, giving only their spare time to the Union; but it maintains a head-office staff of full-time officials, who manage its affairs under the direction of a part-time Executive Committee and an annual or biennial, or triennial, Congress or Conference of delegates from the branches or dists. Naturally, the precise form of organisation differs from Union to Union; but these are the common features. In scope, the Union may be confined to a single trade or craft (*e.g.* weavers, ironmoulders, compositors), or may seek to organise all the workers in an entire industry (*e.g.* miners, railwaymen, iron and steel workers). The existence of these different forms of organisation sometimes leads to overlapping and disputes. In Germany and the U.S.A. the central T. U. federation has wide powers to settle them; but in Great Britain, where the separate Unions were in existence before there was

any strong central body, the powers of the latter are very limited. Often a number of T. U. in the same industry are federated together for common action in industrial matters. Almost all T. U., except those in the public services, provide benefits for their members in case of strikes or lock-outs. In many Unions the expenses of management and negotiation, together with these of strike benefit, absorb nearly all the funds. Only the more skilled workers, with higher wages, can usually afford to pay large enough contributions to cover unemployment and friendly benefits in addition. Pensions to superannuated members are a specially heavy charge, which only a few T. U. can afford; and the heavy unemployment of recent years has caused many Unions to suspend payment of out-of-work benefit. Under British law, payments for political purposes have to be made out of a separate fund, to which contribution is voluntary; and political payments account for only a very small part of total T. U. expenditure. Contributions are payable weekly, and range in most cases from 6d. to 1s. 6d. a week, with still lower rates for women members. In some T. U. in other countries (*e.g.* France) contributions are much lower than in Great Britain, and friendly benefits hardly exist. In America, on the other hand, contributions are substantially higher. The older economists used to maintain that wages were governed by an inexorable economic law, which Trade Unionism would be helpless to influence. Almost none would maintain this view to-day. It is admitted that T. U. can and do exert a widespread and powerful influence on wages and conditions of work, though, of course, their power is limited by their bargaining strength, and greatly diminished in times of bad trade. Action by a T. U. to keep up wages may sometimes result in increased unemployment; but it can also, by compelling employers to make better use of labour in order to render it remunerative, apply a powerful stimulus to industrial efficiency. There is a strong case for holding that Trade Unionism helps the development of industry; and it is beyond dispute that it is of great benefit to the workers. During and after the War, under the influence of Guild Socialism and similar movements, the T. U. in Great Britain, France and other countries put forward a vigorous demand for a share in the 'control of industry.' In Great Britain, this movement was especially active among the miners and builders. Much less has been heard of it lately,

since the slump in trade forced the Unions on to the defensive and removed the immediate possibility of any considerable advance. But working-class demands for the nationalisation or socialisation of industries are nowadays usually coupled, in one way or another, with a claim for a share in control; and the demand would be likely to revive in more vigorous form if industrial conditions were again to become favourable. In Russia, however, where works committees under the T. U. were at first, after the Revolution, accorded considerable power, these powers have been in part withdrawn, and the tendency is to regard the Unions, apart from their functions as bargaining bodies, chiefly as agencies for the provision of social services, such as rest and holiday camps, educational facilities, and so on.

Trade Union Statistics.—The British T. U. had in 1931 a membership of nearly five millions, of whom over three and a half millions were affiliated to the Trades Union Congress, those outside being mainly non-manual workers. The International Federation of Trade Unions had about 13,000,000 members, in 23 different countries—Germany and Great Britain supplying by far the largest contingents. The American Federation of Labor numbered about three millions, while T. U. in the Soviet Union alone numbered eleven million members. The most important British T. U. are the Miners' Federation of Great Britain (in form a federation, but virtually a single union), the Transport and General Workers' Union, the National Union of Railwaymen, the National Union of General and Municipal Workers, the Amalgamated Engineering Union, the Iron and Steel Trades Confederation, and the Weavers' Amalgamation. Trade Unionism is strongest in the mining, metal, textile, building and printing industries, and relatively weak in distribution and in many of the new trades. It is very weak indeed among agricultural workers. Since 1914 there has been a marked increase of organisation among non-manual workers. The teachers, post-office workers, and civil servants are all strongly combined; and many of the Unions of non-manual workers are linked up in a National Federation of Professional Workers, which maintains close relations with the Trades Union Congress. In almost every tn. of importance there is a Trades Council, a federation of the local branches of the various T. U.; but, in face of the centralised control of most of the big Unions, the local Councils have little power. The Ger. movement

resembles the British in this respect, whereas the Fr. is far more decentralised. The British Labour Party has an affiliated T. U. membership of about two millions. The growth of Trade Unionism in Great Britain is shown by the following figures for selected years. At the height of the great movement in the earlier part of the nineteenth century, T. U. membership is said to have risen to a million (1834); but this figure is open to doubt. There are no official figures of total membership before 1892. The Trades Union Congress began with 110,000 members in 1866, and rose to nearly 600,000 in 1875, and then after a setback to nearly 700,000 in 1889. This was more than doubled during the next year, the membership rising to nearly 1,600,000 in 1891. Thereafter it fell off sharply, and did not again pass this figure till 1907. It reached 2,000,000 in 1912, 3,000,000 in 1917, 4,500,000 in 1918, and over 6,500,000 in 1920, after which there was a heavy fall to the 3,500,000 of 1931. Total T. U. membership was 1,500,000 in 1892, reached 2,000,000 in 1906, 3,000,000 in 1911, 4,000,000 in 1913, and 8,500,000 in 1920, after which it fell to 5,000,000 in 1931.

Books.—The standard history for Great Britain is S. and B. Webb, *History of Trade Unionism* (revised 1920). For descriptions of the British movement, see G. D. H. Cole, *Organised Labour* (1924); C. M. Lloyd, *Trade Unionism* (revised 1928), and A. Creich Jones, *Trade Unionism To-day* (1928). For special aspects, see A. Henderson, *Trade Union Law* (1925); G. D. H. Cole, *Workshop Organisation* (1923) and *The Payment of Wages* (revised 1928); J. W. F. Rowe, *Wages in Practice and Theory* (1928); and, for the position in 1913, G. D. H. Cole, *The World of Labour* (revised 1928). For Trade Unionism in other countries there is no general book in Eng. See Paul Louis, *Le Syndicalisme Européen*; L. Levine, *Syndicalism in France*; R. W. Dunn, *Soviet Trade Unions*; and a series of small books published by the International Federation of Trade Unions describing the movement in different countries.

Trade Winds, the currents of air on the earth's surface travelling from the high-pressure belt of the tropics to the low pressure of the equatorial belt. Owing to the eastward rotation of the earth, they have a westward lag. In the N. hemisphere they are N.E., in the S. hemisphere S.E. winds. In March the positions are: N.E. (Atlantic) 3°-26° N.; (Pacific) 5°-26° N.; S.E. (Atlantic) 0°-25° S.; (Pacific) 3°-28° S. In September, N.E. (Atlan-

tic) 11°-35° N.; (Pacific) 10°-30° N.; S.E. (Atlantic) 3°-25° S.; (Pacific) 7°-20° S. From March to July each belt swings northwards; from September to January southwards. Lying in regions where rotational velocity increases only slightly towards the equator, and travelling from restricted to more extended areas, they tend to curve westwards only slightly and are of a mild nature, with an absence of vortices or cyclones. Their steadiness of strength and direction led to the name trade (trend). The configuration of land and water leads to greater curvature and a general formation of great anticyclones, of which the trades form the equatorial half. Towards the W. of the oceans they become more westerly and impinge on the E. coasts of continents, giving satisfactory rainfall. At their origin they are dry, fresh, gentle breezes, but they gradually become damp and stronger, cumulus cloud of characteristic nature forming. The regions are marked by little rainfall and greater salinity over the ocean; the corresponding land regions tending to desert conditions. *Anti-trades* are the return currents from the equator travelling above the trade winds and towards the N.E. They are in part the source of the westerlies on the polar sides of the tropical calms; the term is sometimes erroneously applied to these surface winds. *Reversed trades* occur particularly in the Indian Ocean during the summer, when they form the S.W. monsoons. They succeed in 'dragging' the S.E. trades across the equator, the doldrums thus not occurring.

Traducianism, the theory that souls are propagated in a similar way to the procreation of the body. See Tertullian's treatise *De anima*.

Trafalgar, the name of a cape on the S. coast of Spain, and the scene of the great naval victory of the Eng. fleet under Lord Nelson over the combined Fr. and Spanish fleets under Villeneuve on Oct. 21, 1805. This battle shattered the power of France and Spain at sea at a time when Napoleon had made himself master of Europe and protector of the Confederation of the Rhine. Nelson, after the close of the Danish War in 1801 and his unsuccessful attack on the preparations at Boulogne for the invasion of England, had retired to his estate at Merton. But the short Peace of Amiens was soon dissolved, and Nelson was called upon to resume the command of the Mediterranean fleet (1803). During the winter of 1804 he watched Toulon harbour, where the Fr. were preparing to embark a large body of troops for some unknown destination. Nelson

sailed for Barcelona to draw them out, and in his absence Villeneuve with ten ships-of-the-line and many frigates put to sea (Jan. 18, 1805). Nelson, believing Villeneuve to be going to Egypt, himself sailed for Sicily, but Villeneuve had passed the Straits of Gibraltar and effected a junction with the Spanish fleet at Cadiz. Nelson, on learning this, chased Villeneuve to the W. Indies, whence the Fr. in terror of his name, returned without accomplishing anything. Nelson returned in pursuit, but learning that the enemy had arrived at Cadiz, he returned to England, but immediately volunteered his services again, and joined Collingwood's squadron off Cadiz (Sept. 29). Early in October Nelson received information from which he concluded the enemy would soon put to sea, and having on Oct. 4 laid before his admirals and captains a simple mode of attack, he disposed his fleet in such a manner as to tempt the enemy to come out. The *Euryalus* frigate kept watch within half a mile of the harbour mouth; eight sail-of-the-line were kept at a still greater distance; Nelson, on the *Victory*, remained off Cape St. Mary with the rest of his fleet of twenty-seven sail-of-the-line and four frigates, the frigates extending in a line of communication between him and the seven or eight ships off or near Cadiz. The enemy put to sea on the 19th. The last order given by Nelson, who displayed on this occasion all his wonted animation and confidence, was the historic utterance: 'England expects every man this day to do his duty.' Perhaps the most remarkable phase of the battle itself was the desperate struggle between the *Victory* and *Téméraire* on the one side and the *Redoubtable* and the *Fougueux* on the other, the four ships forming 'as compact a tier as if they had been moored together.' It was a shot from the cross-trees of the *Redoubtable* that killed Nelson, the musket-ball entering the epaulet on the left shoulder, passing through the spine, and lodging in the muscles of the back. The British loss was 450 killed and 1250 wounded. Nineteen of the enemy's fleet (which had comprised thirty-three sail-of-the-line and seven frigates) were captured and one blown up. The prisoners numbered 12,000. The result of the victory saved England from all chance of an invasion and paved the way for the ultimate success of the Anglo-Russian treaty to resist the encroachments of France and to secure the independence of Europe. See J. S. Corbett, *The Campaign of Trafalgar*, 1910.

Traffic Regulations and Signs are

made under the Road Traffic Act, 1930, for the control of motor vehicles. The regulations which came into force Dec. 1, 1930, revoked the Motor Car (Registration and Licensing) Order, 1903, and the Motor Car Registration and Licensing (Scotland) Order, 1903. Under the Act of 1930 the county council or the county borough is the licensing authority for the local residents, and any such council is the licensing authority for applicants not resident in Great Britain. The cost of a driving licence is 5s. The Act provides for tests of fitness to drive, but an applicant for a licence is not entitled to claim to be subjected to a test as to his fitness or ability to drive a motor vehicle if he is an epileptic liable to sudden attacks of disabling giddiness or fainting, or if he is unable to read at a distance of 25 yds. in good daylight (with the aid of glasses, if worn) a series of six letters and figures in white on a black ground of the same size and arrangement as those prescribed for the identification mark of a motor car. The fee for the test in the case of applicants who are entitled to claim is 10s. To pass such a test the applicant must prove his ability to (a) start the vehicle from rest, to move away in a reasonably quick time, and to maintain an accurate course; (b) turn right- and left-hand corners; (c) stop the vehicle within reasonable distance when travelling at various speeds; (d) operate all controls without moving from the driving seat; (e) give all recognised signals; (f) except in the case of a motor cycle, make the vehicle proceed backwards, make a left- and right-hand turn in reverse gear, and back the vehicle into an indicated position; (g) turn the vehicle round within a width of 30 ft. so as to proceed in the opposite direction; (h) stop, hold, and start the vehicle on a gradient of at least 1 in 15 but not steeper than 1 in 10. An examiner must be satisfied as to the ability to drive a motor vehicle of the particular construction or design to which the application relates. Failure of a licensee to sign his licence renders him liable to a fine not exceeding £5. Following the increase in road traffic of recent years, new road regulation devices have been instituted in London and other large cities or towns. One of these has been the direction of traffic along certain streets in one way only (see RULE OF THE ROAD). This system has proved helpful by diverting from busy localities one-half of the vehicles to other roads. The adoption of this method in the neighbourhood of the Mansion House,

London, was, however, abandoned after a short period. The most recent device, and one which has proved particularly effective, is that of electric-light signals instituted in Oxford St., London, in 1931. It operates from New Oxford St. to the Marble Arch, and by its means the traffic moving E. to W. and W. to E. is brought to a halt simultaneously along the whole route and thus permits the movement of traffic from N. to S. and S. to N. This has the advantage of avoiding traffic held up at one point being overtaken by that moving in the rear, and prevents congestion at all points. See C. Romer, *The Metropolitan Traffic Manual*, 1923; G. L. Wilson, *Traffic Management*, 1927.

Tragedy, see DRAMA.

Traherne, Thomas (c. 1637-74), an Eng. writer, a native of Hereford. He was the author of *Roman Forgeries* (1673), *Christian Ethics* (1675), and *A Serious and Pathetical Contemplation of the Mercies of God* (1699), besides poems pub. in 1906, edited by Dobell. His *Centuries of Meditation* are a collection of prose paragraphs which reveal a beautiful and spiritual mind.

Traill, Henry Duff (1842-1900), an Eng. author, b. at Blackheath. He was called to the Bar in 1869, but devoted his spare time to literature, and in 1873 he became a contributor to the *Pall Mall Gazette*. From 1880 to 1895 he was on the staff of the *St. James's Gazette*, and wrote for the *Saturday Review*. He was the chief political leader-writer on the *Daily Telegraph* (1882-97). In 1897 he became first editor of *Literature*, and pub.: *Life of Sir John Franklin*, 1896; *Number Twenty*, 1892; *The New Fiction*, 1897 (collections of essays); and *The New Lucian* (a series of 'Dialogues of the Dead').

Trained-bands, see MILITIA.

Training, see ATHLETICS; GYMNASIICS; PHYSICAL TRAINING; ROWING.

Training Colleges, or Normal Schools, are institutions for instructing young teachers in the principles of their profession. The function of T. C. in the United Kingdom is really two-fold, as the colleges aim at giving a general higher education as well as imparting specific pedagogical instruction. The necessity for such institutions was recognised as early as the sixteenth century by Richard Mulcaster, an Eng. schoolmaster. The education of the young was too often left to persons who had failed in other professions, or who wished to earn a living while waiting for better opportunities. The same danger to educational efficiency was felt as late as the beginning of the nineteenth

century, and is not wholly absent at the present day. Lancaster and Bell both employed the expedient of training teachers by the monitorial system, in which young people still under instruction helped to teach those still younger. In their efforts to establish a well-organised elementary school system, Bell and Lancaster diverged on the question of religion. In 1808 the Royal Lancasterian Society, afterwards called the British and Foreign School Society, was formed with distinct Nonconformist tendencies. In 1809 Bell's followers founded the National Society for Promoting the Education of the Poor in the Principles of the Established Church throughout England and Wales. From these two societies sprang a system of elementary schools and, later on, a number of T. C. In 1839 the British and Foreign School Society College at Battersea was founded, and in 1842 the National Society established one at Borough Road. In 1843 gov. aid was granted in the matter of building T. C.; the British and Foreign School Society founded colleges at Stockwell, Swansea, Bangor, Darlington, and Saffron Walden; while the Established Church responded with diocesan colleges throughout the country. Meanwhile, the rise of colleges of university rank at various provincial centres led to the establishment of day T. C. in connection therewith. Other religious denominations founded colleges with a certain amount of sectarian bias, as the Wesleyan colleges at Westminster (1849) and Southlands (1872). The qualification for entrance to these colleges was success in passing the King's Scholarship Examination, latterly known as the Preliminary Examination for the Elementary Teacher's Certificate, or one of a number of examinations recognised as equivalent; but the denominational colleges also required something in the nature of a religious test. The test was partially abolished in 1905.

In the U.S.A. the course of study in T. C. or Normal Schools varies considerably; the qualifications for entry are not very high, and the course consists of two years' study in the science of education and methods of teaching; one year is devoted to the theory and practice of teaching. Chairs of education have been established at many universities, and in the larger cities City Training Schools have been formed for the training of teachers. Of these schools the best example is the Brooklyn Training School.

See also NURSERY SCHOOLS.

Training Corps, Officers', (O.T.C.). Formed in March 1903 to provide students in schools and universities

with a standardised measure of elementary military training in order that they might eventually become officers in the Territorial and Reserve forces. Those who obtained certificates of proficiency were exempted from a portion of the examination for officers of those forces. The Corps is in two divisions—senior, which includes university units, and junior, consisting of public school units. The O.T.C. did valuable work during the Great War in the provision of officers. The King is colonel-in-chief. The full list of units is in the Monthly Army List.

Trajan (Marcus Ulpius Nerva Trajanus) (c. A.D. 53–117), a Rom. emperor, b. at Italica, near Seville. He received a rigorous military training from his father and gained further experience in the East and in Germany, where he served with distinction. He was in consequence made consul in 91, and at the close of 97 was adopted by the Emperor Nerva, who gave him the rank of Cæsar, and nominated him as his successor. In 101 T., who had succeeded to the throne in 98 on the death of Nerva, set out on his campaign against the Dacians. This occupied him some three years, at the end of which Decebalus sued for peace and T. returned in triumph to Rome. In 114 the emperor left Rome to make war on the Armenians and the Parthians, and in the course of two campaigns he conquered the greater part of the Parthian empire and took the Parthian cap. of Ctesiphon. In 116 he descended the Tigris and entered the Erythrean Sea, but in his absence the Parthians rose against the Roms., and he was forced to return. Besides his military exploits he constructed several great roads, built libraries (e.g. *Ulpia Bibliotheca*), and a theatre in the Campus Martius. His great work was the *Forum Trajanum*, in the centre of which was placed the Column of Trajan. See Middleton, *Remains of Ancient Rome*, vol. ii. pp. 24–29; also B. W. Henderson, *Five Roman Emperors*, 1927.

Tralee, a co. tn. and seaport of Kerry, Irish Free State. Trades in butter and exports grain. Pop. (1926) 10,536.

Trammel-net, see FISHERIES, SEA.

Tramps, see VAGRANTS.

Tramways. By the Tramways Act, 1870, any tn. council (q.v.), co. council, or company can construct Ts. provided they obtain the necessary powers under a private Act of Parliament or a provisional order (q.v.) of the Board of Trade confirmed by parliament. An application by a council for a provisional order must

be authorised by a resolution at a special meeting attended by two-thirds of the members. When a company applies, the consent of the local dist. council is necessary, though, when the Ts. are proposed to be constructed in more than one dist., the Board of Trade can dispense with such consent if the sanction of councils representing dists. through which at least two-thirds of the Ts. will be laid is obtained by the company. Before granting a provisional order the Board of Trade generally holds a local inquiry. Similarly, parliament will not allow a private Bill to be introduced until the consent of the local authorities concerned has been obtained. A local council may, at the expiration of twenty-one years after the grant to a company of the power to construct a T., purchase so much of the undertaking, with the approval of the Board of Trade, as is within its dist., or after the expiration of six months from the opening of the T. acquire it by agreement. Neither under the Tramways Act of 1870 nor under an order has a council power to work a T., and it must lease it to a company in default of being vested with special statutory powers to run the undertaking itself. Any co., mun. bor., or urban dist. council can obtain from the Light Railway Commissioners power to construct a *light railway*, i.e. a tramway worked by steam or electric power upon the public highways (Light Railways Act, 1896).

Iron rails for Ts. principally for use at collieries were first introduced by James Outram, an engineer, in 1776, at the Duke of Norfolk's colliery at Sheffield. Other works were soon carried out by Outram in many parts of the country, and they were called 'Outram ways,' and it is said that the first portion of the word was omitted and the word 'tramway' adopted. Passenger Ts. were first introduced in America in 1832, and were laid down between New York and Harlem. A system which spread rapidly in America was the grooved rail, the invention of a Frenchman named Loubat about 1852. These rails were fixed to longitudinal wooden sleepers. The first T. in Great Britain was laid down in Birkenhead by Francis Train in 1860. He used the step rail, but this was dangerous and inconvenient for the traffic, and the grooved rail was substituted. Liverpool then became the first tn. of any size to adopt and lay down a T., the system being commenced in 1868. The rail, a flat grooved one, was fixed to longitudinal timber sleepers with the bars laid on a concrete bed. It was found, how-

ever, to be dangerous and unreliable, as the rails were liable to shift on the timber and become loose. To obviate this various devices in the form of chairs and other built-up systems were adopted. Charles Burn invented, in 1860, a girder rail, which had the groove planed out after rolling, entailing enormous expense in the production of the rail. Owing to this it was very little adopted. In 1879 an improvement was effected and patented by John Kerr, who produced a girder rail with the groove rolled at the same time, thus materially lessening the cost. This rail was first used at Ipswich and afterwards at Woolwich, Wigan, and Gateshead. This form of rail has proved very satisfactory and is now the type of rail generally adopted. The fish-plates were originally too large to fit into the web of the rail closely, but now they are fixed flush with the web. The latest form of joint is the welded joint. Cars propelled by electricity were first introduced in 1835. Many systems of taking the current were devised, some having a third rail alongside the track as a conductor rail. The Portrush and Giant's Causeway electric T., 1883, was the first T. in the United Kingdom to take current from a conductor. The first electric T. to carry the public in America was constructed in 1884 at Providence, Rhode Is. The cable system of Ts. was adopted largely in America, and the success in its working led to several systems being constructed in England, e.g. Birmingham (central), Edinburgh (northern), Brixton (now electric conduit system), Douglas (Isle of Man), and Matlock. A cable T. at Highgate Hill was the first one of its kind in this country, having been opened in 1884; it was running for ten years. Birmingham and Edinburgh systems were both opened in 1888.

There are two systems by which the current is delivered to the cars. In that in more general use the power is distributed to the system with a pressure of 550 volts at the generator terminals. This gives a pressure of 500 volts at any part of the trolley wire, and the cars are worked by a continuous current. In the other system the power is distributed at a high voltage in the three-phase form. It is then transmitted through three-core paper-insulated lead-covered cables to sub-stations situated at convenient points along the T. route. These sub-stations are equipped with motor-generators which transform the high-pressure three-phase power into a continuous current of about 500

volts. This system is called the alternating system.

There are three systems of electric Ts.: (1) The overhead trolley system; (2) the conduit system; (3) the surface contact system.

(1) *The Overhead Trolley System.*—This system was largely adopted in America. In this country, however, great difficulty was experienced in getting permission to erect the overhead wires. However, Leeds constructed the Roundhay line in 1891 on this principle. Part of the S. Staffordshire Ts. was also converted to the system, and since then the overhead trolley has been generally adopted. A copper conductor is generally supported on insulators at a height of about 20 ft. from the ground by steel transverse wires stretching from poles on either side of the road, or direct by the insulators on to arms stretched on either side of one central pole between the tracks. This copper-wire conductor conveys the electricity from the sub-station to the tramcar. The tramcar is supplied with a trolley pole, having a wheel or bow at the upper end next the copper wire. This wheel collects the power and conveys it to the motors and other apparatus of control on the car. The power, after it has passed through the motors on the car, is conducted to the wheels and then to the rails. Each rail is bonded to the other by means of copper wires and forms a conductor along which the power is conveyed to the sub-station.

(2) *The Conduit System.*—This is the system prevailing in London. The London County Council system is the largest of its kind in the world and the most modern. Many examples are also to be found in some American and European cities. The conductors are situated in a conduit laid down midway between the two rails of each track, and the current is conveyed to the cars by means of a plough which passes through a slot in the road and is fastened to the car. The London County Council's system has the slot rail formed of Z-section rails bolted at intervals to heavy cast-iron yokes, the width of the slot being 1 in. The slot rail weighs 62 lb. per yd. and is 7 in. high. The conductors are two in number and are of soft steel tees weighing 26 lb. per yd., carried on porcelain insulators placed 15 ft. apart, which are fastened to the underside of the slot rails. The surface contact is $3\frac{1}{2}$ in. in width. The conduit has a depth of 2 ft. from the top of the slot rail, and the base of the yokes, which are bedded in concrete, is 2 ft. 6 in. from the surface.

(3) *The Surface Contact System.*—Although surface contact Ts. have been worked successfully in many dists., the method has not held its own in competition with the overhead trolley and the conduit systems. This system consists of contact studs, which are placed about 15 ft. apart along the centre portion of the track, from which 'skates' collect the current for the car propulsion. A surface-contact T. was laid down by the London County Council in the East End of London, but was afterwards removed.

Comparative Costs of Tramway Systems.—Under normal conditions and excluding cable work and other items, which are common to all systems, the cost of track of the conduit system per m. averages out at about £19,000, and of the overhead trolley system, £12,500.

Rail-less Trolley Traction.—This form of traction is not in general use in England, though it has met with success in Austria, Hungary, France, and Italy. The cars are run on roads without rails by means of double-trolley wires. Two systems are in vogue at present, the flexible system and the pole system. The first uses a truck-like collector of the current, having four grooved wheels, two on the positive and two on the negative wires. The pole system is similar to that on the electric overhead system, though, of course, two poles and two wires are needed to obtain a 'return.'

A recent return shows that the Ts. in the United Kingdom now have a mileage of 2500 route m., equal to 4300 single-track m. The total capital expenditure amounts to £99,000,000, representing 330 undertakings. The net receipts of the local authorities owning Ts. amounted to over £5,000,000. The capital expenditure amounted to £22,000 per m. of single track, including all items in the construction. Since 1913 the T. systems of the United States have suffered very severely from the competition of petrol-driven vehicles and the heavy additional costs of running, largely due to the congestion of the streets and roads in tns. and cities through the increase of private cars. For some years these conditions threatened the Ts. with a loss of revenue such as to make them entirely unprofitable, but recently rigorous efforts have been made in economy of working and improvement of organisation, with gratifying results.

See Professor R. H. Smith, *Electric Traction*; Wilson and Lydall, *Electrical Traction*; Ashe and Kelly, *Electric Railways*; W. R. Bowker, *The Practical Construction of Electric Tramways*.

Trance (Lat. *transire*, to cross over), a term loosely applied to many abnormal states of consciousness, particularly to sleep of a cataleptic nature. In former times the condition of T., whether it consisted of a deep sleep or an exalted state of consciousness, was attributed to the passage of the soul out of the body of the subject, and the invasion of another spirit for the time being. The theory of spirit possession has not been discredited; earnest, and, in some cases, scientifically minded investigators are constantly studying such phenomena. From the medical point of view, the T. is held to be a condition of hypnosis, in which the subject may be susceptible to impressions of a hallucinatory nature, and may be entirely impervious to ordinary physical stimuli. See F. W. H. Myers, *Human Personality*; F. Podmore, *Modern Spiritualism*.

Tranent, a small tn. in Haddingtonshire, Scotland. Has an iron foundry, and there are coal mines and quarries in the vicinity. Pop. 4763.

Trani, a coast tn. of S. Italy, prov. Bari, on the Adriatic. It has lost the importance it held during the Crusades, and its harbour has been filled up. Pop. 32,225.

Tranquebar, a maritime tn. of Madras, India, on the Coromandel coast in the Tanjore dist., at the mouth of the Cauvery. It was purchased by Britain from the Danes in 1845. Pop. 13,300.

Transatlantique, Compagnie Générale, one of the most important European shipping companies. It was incorporated in France in Feb. 1855 as the *Compagnie Générale Maritime*, which name was changed in Aug. 1861 to the present title. Its most important services are the regular passenger lines between France and the U.S.A. and between France and S. America and the W. Indies. It has a share capital of 250 million francs, and though in the main it has been profitably worked, its dividends have fluctuated rather spasmodically between nil and 12 per cent. The fleet controlled by the Company (1932) numbers 98 vessels with a total gross tonnage of 743,000. The largest vessels are the *Ile de France* (34,152 tons), the *Paris* (34,572), and the *France* (23,768). A vessel of some 70,000 tons is now (1932) under construction.

Transbaikalia, or Dauria, formerly a prov. of E. Siberia, now included in the Mongolo-Buriat Aut. S.S.R. (q.v.).

Trans-Canadian Highway. A project now being carried out (1932) by eight of the nine provs. of Canada with the assistance of the Dominion Gov. A broad highway, 3500 m. long, will run

from Glace Bay, Nova Scotia, on the Atlantic coast, to Vancouver, British Columbia, on the Pacific. Prince Edward Island, Canada's island prov., is the only prov. not affected. In many cases existing roads will be widened and made otherwise suitable; but in other cases bold engineering tasks must be undertaken. British Columbia has already started on the task of carrying her part of the road from the coast, across the Rocky Mountains, to Calgary, Alberta, and this will form one of the most interesting and beautiful sections of the highway. Another section which presents great scenic possibilities is the land lying along the northern shore of Lake Superior.

Transcaspian Province, a former prov. of Asiatic Russia. It had an area of 213,855 sq. m., and Ashkabad was its cap. It is now included in the Socialist Soviet republics of Uzbekistan and Turkmenistan (*q.v.*).

Transcaspian Railway, a gov.-owned line of Asiatic Russia, with a terminus at Krasnovodsk, a tn. on the S.E. shore of the Caspian Sea. It skirts the southern boundary of the Kara-kum Desert, passing through Merv, Bokhara, Samarkand, Khokand, to Andijan, where a branch line connects with Kushk, on the Afghanistan borders. There is also a connection with the Orenburg-Tashkend Railway running N. between Samarkand and Andijan. The gauge is 5 ft., and the total mileage is 2380 m.

Transcaucasia, formerly the southern div. of the gov. of Caucasia, comprising the military dists. of the Black Sea and the govts. of Baku, Elisavetpol, Erivan, Kutais, and Tiflis, together with the provs. of Batuna, Kars, and Daghestan. This area is now the Transcaucasian Federation, which consists of the three Socialist Soviet republics of Armenia, Azerbaijan, and Georgia (*q.v.*).

Transcendentalism has a double significance: (a) philosophical, and (b) theological. Philosophical T. is associated chiefly with Kant (whose use of the term differs from that of previous philosophers, incidentally), and his successors who defended the idea of a *a priori* (or intuitive) as opposed to a *posteriori* (or experiential) cognition. In a broader sense, T. signifies the spiritual or intuitive attitude of mind. Theological T. is allied to this latter significance; it expresses the idea of a supersensuous religious consciousness, an intuitive perception of divine truth, as opposed to dogmatic rationalism. The most prominent school of theological T. began in New England (the Transcendental Club, 1836), and included Emerson, Ridley, Bronson, Alcott,

Thoreau, Margaret Fuller, and others.

Transept, in architecture, that part of a building which lies across, or in a direction at right angles to, the main axis.

Transfer and Transmission of Shares forms an important part of the duty of the secretary of a joint-stock company, for registration of a forged T. may expose the company to the risk of an action for damages, and to ignore the formalities required by the Companies (Consolidation) Act, 1929 (*see* COMPANY AND COMPANY LAW), may involve both secretary and company in some trouble. Instruments of T. must be correctly signed by transferor and transferee, witnessed, and properly stamped, and the particulars given in the instrument must correspond with the accompanying share certificates (or with the allotment letters if Ts. be accepted before the issue of certificates), and the instrument must be consistent with the accounts of the Ts. in the Register of Members. Sect. 22 of the Act prescribes that shares are personal estate, capable of being transferred in the manner provided by the Articles of Association. This statutory right of T., whether the company be a public or a private one, is absolute, though subject to be controlled by the Articles, which usually state how they are to be effected and in some cases put restrictions on the absolute right of T. Such restrictions are always to be found in the Articles of a private company. Where the directors are given power to refuse to register a T., they must exercise the power by resolution of the board. If the directors are equally divided and there is no casting vote, so that no resolution can be passed, the T. must be registered. In the case of companies the Articles of which contain no restriction on T., the shareholder may transfer his shares up to the last moment before liquidation. The directors cannot refuse registration even though the T. be to a pauper and for the purpose of escaping liability in respect of partly paid shares. The T. will be valid even if the transferor pays the transferee to take it or agrees to indemnify him, so long as the intention is to transfer the beneficial interest in the shares absolutely to the transferee. If liquidation ensues within twelve months, there would not be much advantage in this device, because the transferor would be liable to be put on the B list of contributors. The Articles always require Ts. to be 'in writing' and sometimes to be made by deed. In practice instruments of T. are called deeds and

usually have seals affixed, though strictly seals are necessary only in the case of deeds (*q.v.*). A T. with a blank left for the transferee's name is inoperative as a legal T. if the Articles require Ts. to be made by deed; but where it is necessary that the Ts. shall be 'in writing' a T. in blank may be effective. The Articles usually contain a specimen form of T., giving the directors power in certain circumstances to refuse to register Ts. and fixing the fee to be paid on registration. If not stated in the Articles, the fee should be fixed by resolution of the board. The usual charge is 2s. 6d. for each T. The Articles also in most cases direct that the T. shall be executed by both the transferor and transferee. Execution by the transferee as well as by the transferor is important because the transferee then becomes bound by the contract to take the shares. When Ts. are executed abroad or in the Dominions or Colonies the signatures should be attested by some person holding a public position, such as H.M. consul or vice-consul, a magistrate, notary public, or British chaplain. *Consult* Judge Haydon and Sir Gilbert Garnsey, *The Secretary's Manual on the Law and Practice of Joint-Stock Companies*.

Transfiguration, Feast of the (Aug. 6), commemorates the event in Our Lord's life narrated in Matt. xvii., etc. In the Eng. Church it is a black-letter day, but it is a red-letter day in the American Church.

Transformer. The T. is a device for changing the E.M.F. of an alternating current. The simplest type of T. consists of two coils wound round the same iron ring. One coil, known as the *primary*, is connected to the A.C. supply, and the alternating current in the primary induces an alternating E.M.F. in the other coil, known as the *secondary*. The function of the iron core is to minimise magnetic leakage, i.e. to cause the lines of magnetic induction due to the primary current to thread the secondary circuit and *vice versa*. The magnitude of the E.M.F. induced in the secondary coil is controlled by the ratio of the number of turns of wire in the secondary to that in the primary; where this number is considerable, e.g. in an induction coil, an E.M.F. of several thousand volts may be induced in the secondary by connecting an accumulator in the primary circuit. Ts. are employed in wireless circuits (*see* LOUD SPEAKER) and in ordinary telephone circuits; their most important application is to the transmission of electrical power to great distances. It is

found that it is economic to transmit such power at high voltages. Hence A.C. supply is used and the E.M.F. developed by the generators is transformed up to voltages of the order of 30,000 volts; at the distributing centres Ts. are required to transform down to safe voltages of the order of 200 volts for general use. The technique of the design of efficient Ts. is a specialised branch of knowledge that has received increasing attention in recent years in connection with the development of the 'grid' system of power distribution. *Consult* Taylor, *High Voltage Power Transformers*; *see also* ELECTRICITY AND MAGNETISM.

Transfusion, the passage of fluid from one vessel to another, especially the introduction of fluid into the blood-vessels. Saline solutions are usually used for this purpose, but T. of blood alone provides the necessary ingredients when much blood has been lost. T. is made, in the direct method, from one person to the other without the blood being exposed to the action of the air.

Transit Instrument, an astronomical instrument used for ascertaining the right ascension of a star, i.e. the exact moment of its crossing the meridian of a place. It is constructed in various forms, including the portable. A telescope is accurately mounted on a horizontal axis which turns on pinions in Y bearings carried on two pillars; this axis is placed due E. and W., and the telescope is thus capable of moving in a vertical plane, which is that of the meridian. A small graduated circle fixed to the axis enables the observer to adjust the telescope to the approximate declination. In the focal plane of the telescope a vertical 'wire' made of spider's web is placed accurately central to give the meridian, and other parallel wires are arranged equidistantly. Two horizontal wires are arranged, one on each side of the middle of the vertical wires, and fairly close. As soon as the star enters the field of view the telescope is adjusted so that the image travels between these wires. At the moment the image is bisected by the middle vertical wire, the observer presses a button which registers the exact moment on an electric chronograph. Delicate spirit levels are carried for testing the level of the horizontal axis, and a reversing gear is provided whereby the instrument is lifted and reversed, so that the pinions change places and the opposite part of the meridian may be observed. The reticle in the focal plane is illuminated by means of a lamp carried on a bracket, and

usually transmitting its beams through the horizontal axis.

Broken Transit : In this instrument the eyepiece is fixed at right angles to the telescopic axis, and a prism carried in the central tube reflects the image of the star, which can thus be more conveniently seen. Correction must be applied for 'flexure of axis.'
Prism Vertical Transit : The horizontal axis is here placed due N. and S., so that the telescope moves in a vertical circle passing through due E. and W. The *Transit* or *Meridian Circle* is a more massive instrument, arranged for reading the declination of the star accurately as it crosses the meridian. The graduated circle is in this case much larger, 2 ft. to 4 ft. in diameter, and is sometimes duplicated; the graduations descend to 5 min., sometimes to 2 min. The movement of the telescope is read by the position of the marks on the circle opposite a fixed index. Reading is carried out by means of a micrometer microscope, in the focal plane of which are cross-wires, the intersection of which appears at the exact reading on the circle. The wires are capable of travel by means of a micrometer screw, the head of which is graduated. The movement of this screw necessary to bring the intersection of the wires to the nearest mark on the circle gives the fraction of the division; this can usually be read to within an error of 2 sec., or 1/648000 of the circle. In another form of the instrument the eyepiece of the telescope is arranged to travel by means of a micrometer screw until the wires reach the star, at which position it is kept fixed. At the exact moment contact is arranged to give the time automatically on the chronograph, with a view to eliminating the 'personal equation.' Such an instrument was erected at the Cape in 1903. The methods of transit observation were first used by Tycho Brahe, but the instrument was invented by Olaus Roemer in 1689. The first Greenwich instrument was mounted in 1850.

Trans-Jordan, an emirate lying between Syria and the Nejd, under British Mandatory rule. The country of T.-J. borders the Syrian desert and extends from Syria in the N. to the Gulf of Skaba in the S., and is divided from Palestine by the rvs. Jordan and Yarmuk and the Dead Sea. The northern part is elevated country, rising to about 4000 ft. above sea-level, which, on its western side, declines sharply to the narrow fertile plain of the Jordan valley and, on its eastern, slopes more gradually to grass-lands traversed by the Hedjaz railway and eventually becomes

merged in the desert. This grass-land strip forms the summer pastures of Bedouin tribes who in winter move E. for pasturage. The wheat and barley lands of the Kerak and Balga tribes, of the Circassian colonies, and of Arab villagers lie W. of the railway. The deep lateral valleys yield water for irrigation of valley lands and of considerable land areas of the Jordan depression, which later are cultivated by semi-nomad tribes or used as winter grazing ground. There are many large villages in the N., but the only tns. of any size are Amman (the cap.), Salt, and Kerak. No census has been taken, but the pop. is believed to be between 250,000 and 300,000. The terms of the Mandate for Palestine, with the exception of the provisions dealing with the establishment of a national home for the Jewish people, apply to the administration of T.-J., the Emir of which is Abdullah ibn Hussain, brother of King Feisal (q.v.), of Iraq. In 1928 an agreement was concluded between Great Britain and Abdullah to set up an independent and constitutional gov., while enabling Great Britain to fulfil its international obligations in respect of the country. A legislative council was set up in 1929. The Mandatory representative is a British Resident, assisted by a few British officers, who acts under the instructions of the High Commissioner for Palestine. A local Arab administration has been formed under the Emir. Salt, Kerak, Irbid and Ma'an are headquarters of dist. governors. Up to 1926, public security in T.-J. was maintained by a local force known as the Arab Legion and a number of civil police in the tns., but in 1926 these forces were reorganised, and a military force called the T.-J. Frontier Force was raised in Palestine and T.-J. for the defence of the two territories, while police duties were entrusted to a civil police force, to which the old name of the Arab Legion was given.

Transkei Territory, a productive region of S. Africa, principally in the prov. of Cape of Good Hope.

Translation in literature is the art of rendering the writings of one language into the language of another. The whole virtue of a T., as such, lies in its adequacy, and here a slight distinction must be made between two kinds of Ts. The lower kind attempts to convey the literal meaning of its original, and hence adheres slavishly to the text even at the cost of forced and involved constructions. Ts. from a language at a high degree of culture into a language destitute or almost destitute of literature are apt to be of this kind. Slavish verbal accuracy is

the great fault of the earliest Ts. made into a Teutonic tongue—the T. of the Scriptures into Gothic by Ulfilas. The aim and method of the higher T. is expressed by Dryden in language which has never been bettered. Speaking of poetical T. he says: 'Thus it appears necessary, that a man should be a nice critic in his mother-tongue before he attempts to translate a foreign language. Neither is it sufficient that he be able to judge of words and style; but he must be a master of them too: he must perfectly understand his author's tongue, and absolutely command his own. So that, to be a thorough translator, he must be a thorough poet. Neither is it enough to give his author's sense in good Eng., in poetical expressions, and in musical numbers; for, though all these are exceedingly difficult to perform, there yet remains a harder task; and it is a secret of which few translators have sufficiently thought—that is, the maintaining the character of an author, which distinguishes him from all others, and makes him appear that individual poet whom you would interpret.' There is a last kind of T., which can best be explained by naming its great example, Fitzgerald's T. of the *Quatrains* of Omar Khayyám, the Persian astronomer and poet. Here the T. is not the minister, but the equal and even the superior of its original.

Transmigration, or Metempsychosis, the T. of the soul, as an immortal essence, into successive bodily forms, either human or animal. This doctrine appears to have originated in Egypt. The Egyptians are, moreover, the first who propounded the theory that the human soul is immortal, and when the body perishes it enters into some other creature who may be born ready to receive it, and that when it has gone all the rounds of all the created forms on land, in water, and air, then it once more enters the human body born for it; and this cycle of existence for the soul takes place in 3000 years. Plato extends the cycle of existence to 10,000 years, which is divided into periods of 1000 years, after the lapse of which the souls undergo judgment, and are condemned to punishment or admitted to everlasting happiness. Pythagoras, who is supposed to have travelled in Egypt, brought this fantastic doctrine into Magna Græcia, and made it a prominent part of his teaching. No doubt the Egyptian custom of preserving the mummies of cats, crocodiles, and other creatures, had its origin in the belief that they had been inhabited by souls which might some day claim these bodies for their own.

Transmission of Power, *see* TUBES, PNEUMATIC DISPATCH; GEARING; PULLEY; TRAMWAYS; ELECTRIC DISTRIBUTION; etc.

Transmutation of the Elements. The idea that it may be possible to convert one element into another is a very old one. It formed one of the central ideas of the alchemists who were searching (among other things) for the philosopher's stone which would be the agent for the remarkable feat of turning base metals into gold (*see* ALCHEMY for a history of the early ideas). The facts that iron when placed in a solution of blue vitriol appeared to be converted into copper and that a new substance resembling gold (really an alloy) could be made from copper and arsenic appeared to confirm such possibilities. Naturally their methods were immature, and the distinction between transmutation and replacement was not appreciated. Various alchemists claimed to have discovered the means of converting baser metals into gold. With the discovery of radium and radioactive substances in general a new era opened. Ramsay and Soddy found that radium bromide, by spontaneous change, gave rise to radium emanation, and by spectroscopic examination helium gas was shown to be a product of the change. Now it is quite certain that radium itself is an element, so that here we appear to have a definite example of one element splitting up to give rise to entirely different elements. This disintegration has been shown to be a characteristic property of radioactive bodies. When an atom loses one alpha-particle (a charged helium atom) its atomic weight decreases by 4 and its atomic number decreases by 2. On the other hand, when an atom loses a beta-particle its atomic weight remains unaltered, but its atomic number increases by one. In either case it will be noted that a new element is the product of the change (*see* RADIOACTIVITY). Radioactive series of particular interest in this connection are (1) the Uranium series: in this series the end product of disintegration is lead; (2) the Thorium series: here again the end product of the disintegration is lead. In both series the predominant change is the one involving the loss of an alpha-particle, and thus by degradation we can get member after member of the series where there is a difference in atomic weight of 4 between successive elements, finally culminating in lead. Lead itself is not radioactive, and the change cannot go on further. These spontaneous changes therefore do call to mind

vividly the ideal of the anct. alchemists. Since a large number of elements show radioactivity (some of them to a minute extent), we are faced with endless possibilities. Indeed it may be possible one day to reverse the process and build up more complicated elements from simpler ones.

Transpadane Republic, see CIS-ALPINE REPUBLIC.

Transpiration is the elimination of water vapour from the surface of plants. In flowering plants, the vapour escapes mainly from the stomata, openings on the leaves, and, in fewer numbers, on the stem, and is regulated by two bean-shaped guard cells. Stomata are usually more numerous on the lower surface of dorsiventral leaves, and are larger in light than in darkness. Consequently T. is accelerated by light, as well as by moving air, by warmth, and by dry air. The opening of the stomata in sunlight is associated with the fact that the metabolism, and particularly the anabolic processes, is then most active; it has been estimated that the chemical changes occurring within the plant in bright sunlight might produce a rise of temperature of 12° C. per minute, and death would soon ensue. T., however, is accompanied by a fall in temperature, and permits life and metabolism to be maintained. In addition to the function of regulation of temperature, T. is a means of promoting the ascent of sap in the plant and the influx of solutions of mineral salts from the soil. Excessive T. is responsible for wilting, and garden plants are best watered in the evening so that through the hours of darkness they may make good the water lost during daylight. When T. is taking place very freely, liquid water may be exuded through the cell-walls, particularly at the tips of pointed leaves. Plants growing either in permeable or in water-logged soils have stomata protected (see LEAF) to prevent excessive T. In water-logged soils reduction of T. is necessary to regulate the concentration of mineral salts within the sap. Consult Dixon, H. H., *The Transpiration Stream, Transpiration and the Ascent of Sap in Plants*; Wright, E. C. Barton, *Recent Advances in Plant Physiology*.

Transplanting. Removing seedlings and other plants and trees from one situation to another is found to improve the progress of many plants and specially those of the cabbage tribe, the point of the tap root being broken and a mass of fibrous roots caused to form. In T. shrubs and trees the fibrous roots should be disturbed as little as possible, and precautions taken against the air drying

them. Replanting should be at the same depth, and the roots should be well spread out in the hole prepared for them. Deciduous shrubs and trees are best moved between Oct. and March, while April is the best month for moving evergreens.

Transport. For land T., see RAILWAYS; TRAMWAYS; MOTOR TRANSPORT, COMMERCIAL; MOTOR VEHICLES, COMMERCIAL; CARRIER, COMMON; also LIGHT RAILWAYS, MILITARY and MOTOR TRANSPORT, MILITARY. For sea T., see SHIPS; SHIPPING ROUTES; LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING; also CANAL, DOCKS; LIGHTER and LIGHTERMAN; LIGHTHOUSES, COAST PROTECTION. For air T., see AVIATION, CIVIL OR COMMERCIAL; IMPERIAL AIR ROUTES.

Transport, Military, the process of carrying supplies for a military expedition. The armies of the Middle Ages invariably lived on the country in which they were campaigning, with the result that the inhabitants were quickly rendered destitute of food and the army itself became ineffective through the impoverishment of the country. In modern armies a specialised branch of the military organisation is devoted to questions of T. and supply, and the British Army, through the necessity for colonial and punitive expeditions, possesses a particularly well-developed T. service. Road T. is worked by the Army Service Corps. The supply of field units is divided into two lines, first and second. The first-line wagons carry ammunition, tools, and ambulance supplies, and are in immediate contact with the fighting line; the second line carries camp supplies with a reserve of ammunition, tools, medical supplies, etc. See also MOTOR TRANSPORT, MILITARY.

Transport and General Workers' Union was established to function as from Jan. 1, 1922. The unions comprising the amalgamation are: (1) Complete amalgamation—Dock, Wharf, Riverside and General Workers' Union of Great Britain and Ireland; Amalgamated Society of Watermen, Lightermen and Barge-men; Labour Protection League; National Amalgamated Labourers' Union of Great Britain and Ireland; North of England Trimmers' and Teemers' Association; National Union of Docks, Wharves and Shipping Staffs; National Union of Ships' Clerks, Grain Weighers and Coalmeasures; United Vehicle Workers; National Union of Vehicle Workers; Associated Horsemen's Union; National Amalgamated Coal Workers' Union; North of Scotland Horse and Motormen's

Association; Amalgamated Association of Carters and Motormen; National Union of Dock, Riverside and General Workers; Scottish Union of Dock Labourers; Dundee Flax and Jute Stowers' Society; Greenock Sugar Potters' Union; Wearer Watermen's Association; United Order of General Labourers (Dockers' Section); Association of Coastwise Masters, Mates and Engineers; Irish Mental Hospital Workers' Union; Cumberland Engine-men, Boilermen and Electrical Workers. (2) Amalgamation for financial and economic purposes—North Wales Quarrymen's Union; North Wales Craftsmen and General Workers' Union; National Amalgamated Union of Enginemen, Firemen, Motormen, Mechanics and Electrical Workers, North of England Commercial Section (Amalgamated Society of Carters, Lorrymen and Motormen). The union's objects include the regulation of salaries, wages, hours of work, general conditions of employment, provision of strike, lock-out, and victimisation pay, legal protection and other benefits; promotion and support of parliamentary action through the Labour Party, and Labour Representation in parliament, on local authorities, etc., educational work, research, publicity, etc. The Union claims to have done considerable constructive work since its formation, and takes credit, in part, for the solidarity and victory of the workpeople during the first National Strike in the history of the dock industry in 1924. The Union states that the London Traffic Strike of 1924 achieved the claims submitted on behalf of the workpeople, brought the question of the re-organisation of the traffic in the London area into the realms of politics, and that it was primarily responsible for the passing of the London Traffic Act and the subsequent appointment of the London and Home Counties Traffic Advisory Committee. The T. and G. W. U. was one of the constituent unions of the Trades Union Congress General Council which took part in the National Strike of 1926, having 333,000 members actively involved. (See STRIKE, GENERAL.) The offices of the Union are Transport House, Smith Square, Westminster.

Transportation. According to Stephen the earliest instances of T. as a punishment in England probably occurred in the reign of Charles II., when pardons were granted to persons under sentence of death conditionally on their being transported for a number of years—usually seven. T. was unknown to the common law

(*q.v.*), a fact which seems to be capable of explanation on the ground that England had no colonial empire of any pretensions before the Stuart period. There was, however, at common law, an analogous punishment, viz. exile, which followed on conviction when a criminal took sanctuary and confessed; the criminal in such case was permitted to leave the kingdom under an oath of abjuration binding him never to return. T. was first legalised by an Act of 1719. During the eighteenth and early part of the nineteenth century, numerous Acts were passed by which various terms of T. with alternative terms of imprisonment, and, in some cases, whipping either as an alternative or cumulative punishment, were allotted to specific offences. These statutes appear to present no sort of consistent principle, for in certain classes of cases the sentence was T. for life; in two the punishment was absolute without alternative; while, in another, power was given to transport for any other term without fixing any minimum term of T. or any alternative term of imprisonment. T. was gradually abolished between 1853 and 1864, principally because the colonies objected to receive the convicts; penal servitude or imprisonment with or without hard labour being substituted. But as the Penal Servitude Acts authorise the carrying out of the sentence in any part of the dominions, the difference between T. and these two punishments seems verbal only; and again, the provisions of the Act of 1719 are still in force as regards prisoners under sentence of penal servitude. See LABOUR COLONIES.

Transporter Bridge, see BRIDGE.

Transposition in music is the act of changing to a higher or lower key. It refers to the change of key of a composition *en bloc*, *e.g.* for the convenience of the register of a particular voice or in adaptation to a particular group of instruments, and is not to be confused with *modulation* (*q.v.*), which refers to change of key within the structure of a musical work. T. is a simple process for a single melodic line, but involves thorough musical knowledge when applied to a harmonic structure.

Transubstantiation (Lat. *transubstantiatio*, change of substance), the change which is believed by Rom. Catholics to take place in the Eucharistic elements of bread and wine, in virtue of the consecration, viz.: 'The whole substance of the bread is changed into the body of Christ, and the whole substance of the wine into His blood, the species alone

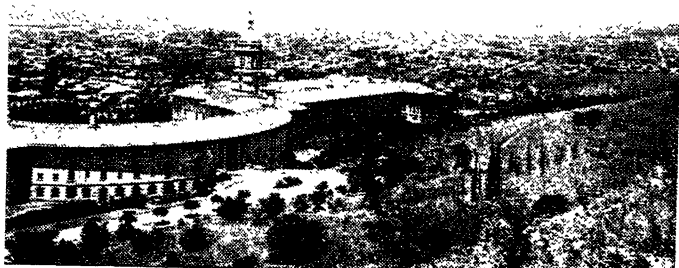
remaining.' By species is here meant the accidents or appearances, i.e. those qualities or conditions which produce upon the senses the impression of the presence of bread and wine. T. is conceived as essentially a conversion affecting the substance of the bread and wine. Hence the 'appearances' or accidents remain unchanged.

Transvaal, an original prov. of the Union of S. Africa, lies immediately N. of the Orange Free State and Natal and S. of Southern Rhodesia, bounded E. by Portuguese E. Africa and Swaziland, and W. by the prov. of Cape of Good Hope and the Bechuanaland Protectorate. The Limpopo or Crocodile R. flows along its N. frontier, and the Vaal R. marks its S. border. The area of the prov., which is divided into twenty-three dists., is 110,450 sq. m. In 1931 there was a white pop. of 695,963, an increase of 152,478 since 1921. In 1921 Bantus numbered 1,219,845 and other coloured races 45,805. In 1903 about 7000 sq. m., including the dists. of Wakkerstroom, Utrecht, and Vryheid, were annexed to Natal. The surface has an average elevation of 4000 ft. A plateau, called the High Veld or Hooge Veld, extends across the prov., broken here and there by low mountains and detached heights. The chief mountains are the Witwatersrand, lying between Pretoria and Johannesburg on the E. and Mafeking on the W.; the Lydenburg and Barberton Mts. in the dist. of Barberton; the Zand River Mts. in the dist. of Waterberg; and the Murchison and Zoutpansberg ranges in the Zoutpansberg dist. The land slopes in wide plains in three directions—N. to the Limpopo, S. to the Vaal, and E. to the sea. The High Veld forms the watershed between the basin of the Limpopo and the basin of the Vaal, their numerous tributaries, including the Olifants R., the Ingalele, the Zand R., the Marico, and numerous other streams, flowing N. and S. from the Witwatersrand. The rivs. in the S.E. of the prov. flow towards Delagoa Bay. The largest lake is Lake Chrissie, N.E. of Ermelo, S. of the Witwatersrand Range, which forms the northern limit of the High Veld area, the climate may be regarded as not only uniformly healthy, but as perhaps the most delectable in the world. Even in summer the heat is rarely oppressive and the nights are cool; a rainfall of about 30 in. occurs generally in short and sometimes violent thunderstorms. The Berg winds, at times so oppressive on the coast are unknown. In the winter, night frosts are frequent and winds are cold. Every few years a

snowfall occurs, occasionally to a depth of several in. The chief industry is gold-mining, extensive mines being in operation near Johannesburg, Witwatersrand, and Barberton. The output of gold exceeds £40,000,000 (from the earliest existing records to the present time the value of the gold output is over £1,000,000,000), and diamonds are exported to the value of over £1,000,000 yearly. The largest diamond mine is the Premier Mine, 25 m. E. of Pretoria: it yields the great bulk of the T. mine stones. The level at the end of 1928 was 510 ft. and from the material excavated over 50 tons of diamonds had been extracted. The principal sources of alluvial diamonds are in and near the bed of the Vaal R., in the S.W. T. (the total value of the diamond output from the earliest records to the present time is about £50,000,000). It was on Jan. 16, 1905, that the 'Cullinan,' the largest white diamond, was found; its weight was 302½ carats (1½ lb.). Other minerals are coal, copper, and tin. In addition to the export of minerals, there are large exports of horses, mules, tobacco, coal, wool, clothing, jewellery, skins, hides, horns, machinery, hardware, and coaches. Since the establishment of the Union, there are no separate records of trade for each of the provs., but the British Board of Trade figures show that the value of imports from the T. to the United Kingdom was about £6,000,000 in 1927 and the value of exports from the United Kingdom to the T. was £3,300,000. The T. has iron and brass foundries and engineering works, grain mills, printing works, tobacco factories, brick and tile and pottery works, breweries, coach and wagon works, soap and candle factories. Agriculture is also a prominent industry and continues to grow in importance. The production of wheat on European farms ranges from three million to six million cwt.; but the larger crop is maize, the annual production on European farms being upwards of ten million cwt. The veld supports large numbers of cattle, horses, sheep, and pigs (the live stock in 1928 numbered close upon 3,000,000 cattle, 4,000,000 sheep, 850,000 goats). The annual expenditure of the prov., £3,600,000 (1928), is about equal to the revenue. There are over 1100 primary schools with 120,000 pupils; over forty beyond-primary schools; 432 state and state-aided schools for coloured, native, and Indian children; four primary institutions for European teachers and three for coloured teachers. No doctrine or dogma peculiar to any religious denomination

or sect may be taught. The Dutch churches take first place, being followed by the Anglican, Presbyterian, Methodist, Rom. Catholic, Lutheran, etc. The Transvaal Police consists of about 1550 officers, non-commissioned officers, and men. The cap. of the T. is Pretoria, which is also the administrative cap. of the Union of S. Africa (white pop. 62,096, census 1931), but the largest tn. is Johannesburg, with a pop. of (white), city and suburbs, 203,273 (census 1931). Johannesburg is 5740 ft. above sea-level and is built close to the summit of the Witwatersrand. It sometimes suffers from

Chaka, by Pretorius, the independence of the republic was acknowledged by Britain at the Zand R. Convention of 1852, and Marthinus Wessels was elected president three years later. The Boers were constantly at war with the natives, especially on the N. and E. borders, and in 1876 a commando was sent to attack Sekukuni, a native chief living S. of the Olifants R., which, however, was defeated. This reverse caused the Transvaalers to appeal to Britain for help. In consequence of their financial difficulties and troubles with the natives, the country was annexed to Britain in 1877 by Sir Theophilus Shepstone.



[Courtesy of South African Government]

PRETORIA FROM MENTJES KOP, SHOWING BACK OF THE UNION BUILDING

cold southerly winds, which, prior to the extensive planting of trees and the improvement of roads, were the cause of heavy dust storms. The gov. is aided by a Provincial Council of fifty elected members. There is an Executive Council of four members. The T. was practically unknown territory before the advent of the Boers, who trekked from Cape Colony in 1836-37, and first came into collision with the Matabele in the vicinity of Kroonstad in the Orange Free State and finally drove them from N. of the Vaal, which they crossed themselves in 1836. Under the command of Hendrik Potgieter, they drove the Zulu warriors of Moselekatse, the revolted general of Chaka (successor of Dingiswayo, chief of the Ababwetwa, and leader of a confederation of warriors of Zululand), across the Limpopo. After the overthrow of Dingaan, the successor of

Three years later the Boers took up arms for the restoration of their independence, and after the fall of Colley at Majuba Hill, they gained their object in 1881, subject to the suzerainty of Queen Victoria. The discovery of gold in 1886 brought a great influx of 'Uitlanders,' who were looked upon with disfavour by President Kruger. These Uitlanders were treated with great harshness, and difficulties arose, leading to the Jameson Raid and the gauntlet being thrown down to Britain in 1899, culminating in the Boer War, which resulted in the loss of the Boer independence in 1902. On May 31, 1910, the T. was merged in the Union of S. Africa. See also SOUTH AFRICA, UNION OF. Consult P. Kruger, *Memoirs of Paul Kruger*, 1902; W. J. Leyds, *The First Annexation of the Transvaal*, 1906; W. C. Willoughby, *Native Life on the*

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Transvaal Border, 1900; W. M. MacMillan, *Complex South Africa*, 1930; Sir Geo. E. Cory, *The Rise of South Africa and Economic Conditions of the Union of South Africa* (British Gov. publication), 1929.

Transverse and Transversal, in geometry, the straight line drawn intersecting two parallel straight lines. The angles formed are thus related: (1) alternate angles are equal; (2) the exterior angle is equal to the interior and opposite angle on the same side; (3) the sum of the two interior angles on the same side is equal to two right angles.

Transylvania, a former principality, from 1868 to 1918 incorporated with Hungary, of which it formed the eastern portion, and since 1918 a prov. of Rumania. The Carpathian Mts. lie on its E. boundary, and the Transylvanian Alps to the S. The area is 22,312 sq. m. The surface is tableland, mountainous over the greater part, and is watered by the numerous affluents of the Pruth and the Theiss. The minerals embrace gold, silver, copper, iron, quicksilver, lead, and salt. Stock-raising, agriculture, and fruit-growing are important industries; wine is made and brandy distilled. A fertile plain in the centre of the country yields large crops of maize, wheat, rye, flax, hemp, potatoes and tobacco. There are 5,500,000 acs. of forest. Cluj (former Kolozsvár or Klausenburg), Brasov (Brasso, Kronstadt) and Sibiu (Nagy-szeben, Hermannstadt) are the chief towns. T. is divided into 23 dists. It sends 112 members to the Rumanian Chamber of Deputies and 45 to the senate. It is the seat of archbishops of the Rumanian Orthodox and Gk. Catholic churches. Since coming under Rumanian rule, the educational system has been greatly improved; a university was founded at Cluj in 1919. Pop. 2,678,367, consisting of Rumanians, Magyars, and Gers. T. corresponds with the Rom. Dacia, which was overrun by the Huns under Attila in the fifth century. This invasion was followed by incursions from the Gepidæ, the Avars, the Slavs, and the Magyars under Almus, who appeared at the close of the ninth century. In the thirteenth century many thousands of Gers. settled in T., which in the sixteenth century became a principality when John Zapolya, the voivode of T., threw off his allegiance to the emperor and acknowledged the suzerainty of the sultan. In the early part of the nineteenth century efforts were made to bring about a union with Hungary, which ended in T. being made a crown land of Austria in 1849. It was finally merged into

the Austro-Hungarian empire in 1868. It passed to Rumania after the Great War. See E. Gerard, *The Land Beyond the Forest*, 1888.

Trap, a term applied vaguely, in geology, to any dark-coloured fine or medium grained basic igneous rocks, such as dolerite and diabase. Mica-trap is the name applied to mica-lamprophyre. These trap rocks occur as dyke rocks and lava flows.

Trapani, a seaport on the N.W. coast of Sicily, cap. of the prov. of the same name. It is an episcopal see, and has a famous statue of the Madonna. There is trade in coral and mother-of-pearl goods. It was originally a Carthaginian fortress. Pop. (1928) 83,766.

Trapezium and Trapezoid, in Euclidian geometry, are plane quadrilateral rectilinear figures; the former has no parallelism between opposite sides, the latter has one pair of opposite sides parallel.

Trapezus, see TREBIC.

Trapping, the art of so constructing mechanical snares as to capture or kill some animal. The art is probably one of the oldest in existence, since even the earliest and most uncultured peoples of whom we have any record used traps, although they were usually devoid of any mechanical contrivance, and merely consisted in the digging of a cavity into which the unsuspecting victim fell. Bird traps, on the cage principle, and door traps are traps used for the purpose of capturing the victim without injury. Other traps are so constructed that they seize the victim, but at the same time, except under special circumstances, do it no injury; whilst a third variety consists of a mechanical contrivance not only for capturing but for killing the victim.

Trappists, a religious order which owes what was practically its foundation to Dominique Armand Jean le Bouthillier de Rancý (1626-1700). Until the age of thirty-four de Rancý led the voluptuous life of a courtier-priest. Then in 1680 a sudden change came over him and he retired to live a life of austerity and devotion in the Cistercian abbey of La Trappe, which had long formed part of his possessions. The abbey, which had been founded about the middle of the twelfth century, was lax in discipline, and it was with the greatest difficulty that de Rancý introduced a stricter observance. The new community devoted itself to the observance of strict silence and seclusion from the world, to hard labour, to total abstinence from wine, meat, eggs, fish, and all seasoning of their simple diet of bread and vegetables. There are

Trappist monasteries at Coalville, Leicestershire, and Caldy Island, S. Wales.

Trasimene Lake, also known as **Lake Perugia**, in Umbria, Italy. In 1598 it was partially drained into the Tiber, some 5500 acs. of land being reclaimed. Famous for Hannibal's great victory over the Romans under Flaminius, gained on its shores in 217 B.C.

Traun, Lake, is situated in Upper Austria. It is about 7 m. long, and is 1355 ft. above sea-level, having on its E. side the Traunstein (5450 ft.).

Trautenau, or **Trutnov**, a tn. of Czechoslovakia, on the Aupa. It is chiefly engaged in the linen industry. Pop. 16,200.

Travancore, a feudatory state of the Madras Presidency, India, stretching along the Malabar coast from Cape Comorin to Cochin, its shores being washed by the Indian Ocean. It is 140 m. long, with a maximum breadth of 70 m. Area 7625 sq. m. Pop. (1921) 4,006,062. The coast is low, but the foothills of the Western Ghats diversify the scenery and slope towards the ocean. Its cap. is Trivandrum. Since 1923, as one of the Madras states, it has been brought into direct relation with the Indian Gov. The principal products are copra, areca nuts, beeswax, ginger, cardamoms, coffee, pepper, and timber. See *Mateer's Native Life in Travancore*, 1883.

Travellers, see **COMMERCIAL TRAVELLER**.

Traveller's Joy, see **CLEMATIS**.

Traveller's Tree, or *Ravenala madagascariensis*, a tree with long and large fan-shaped leaves, the petioles or leaf stalks of which form a large cavity at their base. In this water collects and is drunk by animals and travellers.

Traverse, in pleadings, means denying the whole or some essential part of the averments of fact contained in the opponent's pleading. There are two other ways of dealing with the opponent's pleading, namely, by *confession and avoidance* (q.v.) and by an *objection in point of law*. Formerly the party pleading had to elect which of these three courses to adopt, but now he may adopt either or any of these methods, though a good pleader will not multiply the issues needlessly, for the client may be ordered to pay the costs of the issues on which he fails. A T. cannot be made to do the work of a plea in confession and avoidance; its office is to contradict, not to excuse. Matter justifying an act may not be inserted into a plea which denies the act. As a rule the burden lies on the opponent to prove at the trial the

facts which are traversed in the pleadings. There are three fundamental rules in traversing: every allegation of fact, if not denied specifically or by necessary implication or stated to be not admitted in the pleading of the opposite party, will be taken to be admitted (except as against an infant, lunatic, etc.); each party must deal specifically with each allegation of fact of which he does not admit the truth, except damages; and when a party denies an allegation of fact in the previous pleading of the opposite party, he must not do so evasively, but answer the point of substance.

Traverse City, in Michigan, U.S.A., on the Boardman R., the co. seat of Grand Traverse co. Has a good climate and picturesque scenery, and is a tourist resort. Manufs. agricultural implements, sleighs, furniture, and lumber and machine-shop products. Pop. (1930) 12,539.

Traverser Bridge, see **BRIDGE**.

Travertine, or **Calc-sinter**, is porous calcareous material deposited from mineral springs (q.v.). It may be chalk-like in texture, but is often hard enough for building stone, many of the buildings in Rome (e.g. St. Peter's) being built with it. At San Filippo the T. is deposited at the rate of 3 ft. a year.

Travnik, a tn. of Yugoslavia, on the Lasva, 45 m. N.W. of Sarajevo. It has an old castle and a horse-breeding establishment. Pop. 6700.

Trawling, see **FISHERIES, SEA**.

Treacle, the dark-brown mother liquor remaining when sugar is crystallised from the expressed juice of the sugar-cane. The T. or molasses contains about 50 per cent. of sugar which does not crystallise owing to impurities. In the W. Indies, T. is used for the distillation of rum.

Treadmill, a mill, in 'cant' language known as 'the everlasting staircase,' worked by persons treading on steps fixed on the periphery of a wheel. It was used chiefly as a means of prison discipline, or to give useful employment in the shape of grinding corn or moving machinery to persons imprisoned for crime, and came under the category of 'hard labour.' The prisoners held on to a hand rail and worked in separated compartments, the speed being regulated by a warder by means of a lever. The T. has now been discarded for many years.

Treason, means treachery against the sovereign. By the Statute of Treasons, 1352, it is T.: (1) To compass the death of the king, queen, or their eldest son. 'Compass' imports design, which must be manifested by

an overt act (*e.g.* providing weapons), for idle words do not now constitute T., though they may amount to a misdemeanour. The conviction of Peacham and Sydney shows that the commission, even without publication, of 'reasonable' ideas to writing is T., but it is extremely doubtful whether a modern judge would direct a conviction for T. at the present day. (2) To violate the king's companion, eldest unmarried daughter, or eldest son's wife. (3) To levy war against the king in his realm. This includes levying war to reform religion, remove councillors, or redress grievances, inasmuch as private persons may not forcibly interfere in grave matters, *e.g.* in Anne's reign Damarce and Purchase were convicted of T. for burning certain dissenting meeting-houses, the court inferring a general design against the state. (4) Adhering to the king's enemies in his realm by giving them aid in his realm or elsewhere. The overshadowing power of present-day central govs. makes it grotesque for any individual to hope to approach a project of rebellion in England with the prospect of even partial success. When the case of *R. v. Lynch* (1903) came before the courts there had not previously been a charge of high T. tried for sixty-two years. It was moved to quash the indictment (*q.v.*) in this trial on the ground that each count charged an adhering 'without the realm' (*viz.* in the Transvaal), and so disclosed no statutory offence. The court held that the statutory words did not mean merely that the accused *being in the realm* has been adherent to the king's enemies *wherever they were*, for that so narrow a construction not only would enable an Englishman to engage with a hostile Power against his own country so long as he took care to remain abroad, but also makes the words 'or elsewhere' meaningless. (5) Counterfeiting the king's seal or money or importing money (not now T.). (6) Slaying the chancellor, treasurer, or king's justices. The punishment for T. was formerly hanging, drawing, and quartering after the traitor had been dragged to the place of execution on a hurdle; it is now hanging only. T. cannot be committed against a *de jure* king who is not also *de facto* king. In the case of *Roger Casement (q.v.)* in 1916 it was decided that a man may 'adhere to the king's enemies in his realm' and be found guilty of T. whether the act complained of was committed within or without the realm. This is the sole conviction for T. within modern times. In another case, also decided

during the Great War, the conviction was upset on appeal (*R. v. Ahlers*). In that case Ahlers, Ger. consul at Sunderland, took steps, on Aug. 5, 1914 (the day following the outbreak of war), to assist Ger. subjects of military age to return to Germany to join the Ger. army; on Aug. 5 an Order in Council was made under the Aliens Restriction Act, 1914, limiting the time of departure of alien enemies to Aug. 11. Ahlers, however, knew nothing of this Order, but believed he was acting in accordance with International Law. He was indicted for T. and convicted of 'adhering,' but the conviction was quashed on the ground that there was no proof that in acting as he did he was not merely carrying out his duties or that he was aware that he was assisting the king's enemies.

By the constitution of the U.S.A., T. consists in levying war against them or in adhering to their enemies, giving them aid and comfort. The punishment by an Act of 1790 is death by hanging; it was altered at the time of the Civil War to death, or at the discretion of the court imprisonment for at least five years with hard labour and a fine of not less than \$10,000; this included disability to hold office. In some state constitutions there are provisions for T. against the state as distinct from the Federal Gov.

Treasure Trove. Money, plate, or similar articles discovered hidden in the earth or some other secret place for so long a time that the owner is unknown. In default of finding the owner, the established principle of Eng. law is that the crown is entitled to the treasure. Finders are legally entitled to obtain the market value of their discoveries, without any deduction for expenses. The precise position is explained in an agreement arrived at in 1931 between the British Museum and the Treasury, and approved by the Home Office and the Coroners' Society (*see also* CORONER). The chief finds in Great Britain are of gold and silver coins, and the orthodox definition of T. T., 'objects of gold or silver which have been hidden in the soil or in buildings, and of which the owner cannot be traced,' is repeated in the leaflet issued by the British Museum on the agreement, which points out that finders should report to the coroner either direct or through the police or the Director of the British Museum. If the objects are retained by the crown or a museum, the finder will receive their full market value; if not retained, he will receive back the objects, or, if he wishes it, the British Museum will sell them at the best

price obtainable. These funds are of historical importance, and the Treasury undertaking their disposal is useful in preventing loss to the nation.

Treasury, a gov. department which controls the management, collection, and expenditure of the public revenue (*q.v.*, and see also CONSOLS; PUBLIC DEBT; and TERMINABLE ANNUITIES). In the Plantagenet period the T. was known as the *Scaccarium* (Exchequer) and was so named because the committee of the king's continual council (see CABINET and PRIVY COUNCIL) when sitting for revenue purposes sat round a *chequered* table in a room which was therefore called the *Scaccarium*. The head of the Exchequer was the Treasurer, an official who became, during the reign of Elizabeth, the most prominent official in the state. In 1612 the T. was placed in commission, and that is its present constitutional condition, although its real head is the Chancellor of the Exchequer. The titular head is the First Lord of the T., who is almost invariably the Premier.

The T. department of the U.S.A. is more varied and complex than any other U.S. gov. department; it is responsible for the finances of the gov. and the control of the currency. It was first established as a T. office of accounts, 1776; it was reorganised in 1779, and in 1789 the present department was established by Act of Congress. Its chief is a secretary who is a member of the cabinet, and who has three assistant secretaries. It is divided into a number of divisions and bureaus for various functions.

Treasury Solicitor, the legal adviser to the gov. departments. He defends actions brought against ministers or certain other public functionaries. He deals with such intestate estates as escheat (*q.v.*) to the crown. He is generally a qualified barrister. As to his duties in his capacity of King's Proctor, see under that title.

Treating, see ELECTIONS.—*Corrupt and Illegal Practices at Elections.*

Treaty. The T.-making power is the prerogative of the crown (*q.v.*), as is the power to conclude peace. The negotiations for a T. are begun by sending to the minister representing the crown in the country with whom the T. is to be made an instrument under the Great Seal (see SEAL) containing the authorisation to sign a T. The T. itself usually contains a clause providing for its ratification by both sides, and until the ratifications are exchanged neither party is bound by the T. The crown in theory is the sole T.-making power in England, but it seems to be a settled principle that a T. which lays a pecuniary burden on

the people, or which alters the law, requires parliamentary sanction.

In the U.S.A. Ts. are negotiated by the President, but have to be ratified by the Senate, which has often refused to ratify negotiated Ts., or at times claims the right to ratify only a portion of the projected T. Even after ratification Congress may, in its turn, withhold the necessary legislation to carry the stipulations of the T. into effect. No satisfactory classification of Ts. is possible because such instruments cover the entire sphere of international relations, but a broad distinction is drawn between those which produce their effect once and for all, such as Ts. of cession and boundary Ts., and those which purport to regulate the relations of the parties for a definite or indefinite period, as, for example, extradition Ts., commercial Ts., alliances, and Ts. of guarantee. The former are sometimes called 'transitory' or 'executed' conventions, the latter 'executory' conventions. It is important to distinguish between Ts. which are mere private arrangements concerning two or more states and those which are concluded by a number of leading states for the purpose of supplementing or amending existing provisions of international law, or, in other words, law-making Ts., e.g. The Hague Conventions, the Declaration of Paris, 1856, and the Covenant of the League of Nations. A T. of guarantee may be collective or joint and several, whereby a guaranteeing state would be obliged to fulfil, if necessary, its obligations alone even though its co-guarantors refused to fulfil their obligations. An historic example of such T. was the Quintuple T. of 1839 (the 'scrap of paper') (see QUINTUPLE TREATY), which established the neutrality of Belgium. When Germany violated this neutrality and that of Luxembourg, Sir Edward Grey in 1914 affirmed the view of Lord Clarendon in 1867 that the British obligation to intervene was several as well as joint, or, in other words, that she could be called upon to act singly even if the other guarantors refused to act, but that this obligation applied only to the neutrality of Belgium and not to that of Luxembourg. For the states members of the League of Nations the condition precedent of registration of a T. requires to be satisfied before the T. comes into force. By Art. 18 of the Covenant (*q.v.*) every T. or international engagement entered into by any member of the League must be registered with the Secretariat and be published, and will not be binding until it is registered. Art. 19 provides

machinery, though not very effective, by which the League may from time to time advise the reconsideration by members of the League of Ts. which have ceased to be applicable. Ts. affecting the rights of third parties cannot be said to be abrogated or even suspended by war except in so far as war causes for the time being difficulties of performance. But the practice is by no means uniform: e.g. after the Crimean War, fresh Ts. of commerce were concluded; after the Turco-Italian War the Treaty of Lausanne, 1912, renewed all Ts. and engagements of every kind existing before that war; and after the Great War the Ts. of peace revived a number of multilateral Ts. of an economic or technical character, in some cases introducing new clauses. With regard to bilateral Ts., each of the Allied states was empowered to revive such of its Ts. with the enemy states as it wished.

In the United Kingdom, subject to possible exceptions, a T. has no effect on private rights, and if the crown concludes a T. which is intended to modify such rights, it must obtain an Act of Parliament to give it that operation. In the U.S.A. it is otherwise, for the 6th Art. of the Constitution provides that 'all Ts. made or which shall be made under the authority of the U.S.A. shall be the supreme law of the land, and the judges in every state shall be bound thereby, anything in the constitution or laws of any state notwithstanding.' Hence when the 9th Art. of the Jay Treaty in 1794 enabled the subjects of either country to hold lands in the other, and to sell or devise them as if they were natives, this stipulation at once took effect in the U.S.A. in favour of British subjects, repealing of itself so much either of common law or of statute law on the disabilities of aliens as stood in its way; while in England an Act of 37 Geo. III. had to be passed to give effect to the reciprocal stipulation in favour of the citizens of the U.S.A. Consult *The Collected Papers of John Westlake on Public International Law*, ed. by L. Oppenheim, 1914.

Trebbia, or **Trebia**, a riv. of Italy, noted for the victory gained on its banks over the Romans by Hannibal in 218 B.C. It rises in Liguria in the Apennines, and flows in a N.E. direction through Emilia, joining the Po above Piacenza. Length 71 m.

Trebić, **Trebizond**, **Trapezus**, or **Trabzon**: (1) A vilayet of Turkey in Asia, extending along the shore of the Black Sea. It is well forested, and zinc and copper are found. Area 1808 sq. m. Pop. (1927) 290,300. (2) The cap. of

the above vilayet, is a port on the Black Sea, 108 m. N.W. of Erzerum, formerly of great importance as an emporium for the wares of Kurdistan and Persia, but has lost much of its transit trade since the Batum-Tiflis Railway was opened. The chief exports are hides, skins, eggs, opium, tobacco, and filbert nuts. Its silk industry is declining. T. was founded in 600 B.C. by Gk. settlers from Sinope. In 1204 it was the cap. of Trebizond, an empire constituted by Alexius Comnenus. It became Turkish in 1462. In 1895 it was the scene of the Armenian atrocities. It was captured by the Russians in 1916, but in 1918 was retaken by the Turks. Pop. (1931) 23,195.

Treble, the highest part in three- or four-part vocal music, especially applied to boys' voices; the corresponding pitch in the female voice being known as *soprano*. Originally, the dominant part of harmonised song was the lowest; a higher part was known as *alto*, and one still higher was called *T*.

Tredegar, a tn. of Monmouthshire, England, 17 m. N.W. of Newport. The chief industry is coal mining. Pop. (1931) 23,195.

Tree, a perennial plant with a woody stem and branches differing only in size from a shrub. In palms and some other trees the terminal bud of the primary stem is the only one to develop and thus a long, unbranched trunk is formed. Ts. do not often exceed 100 ft. in height in Britain, but the sequoias or redwoods of California are known sometimes to exceed 300 ft.—the greatest authentic height is 325 ft. The *Eucalyptus amygdalina* of S. Australia grows to about 280 ft., and the Douglas fir in British Columbia and Washington reaches some 200 ft. See also PLANTS; FORESTRY; GYMNOSPERMS; ARBORICULTURE; TIMBER (law).

Trees, Sir Herbert Beerbohm (1853-1917), Eng. actor-manager, b. Dec. 17, in London, second son of Julius Beerbohm. Educated Schnepfenthal College, Germany. Assumed name of T., and made first appearance on stage in 1876. First great hit, as Rev. Robert Spalding in *The Private Secretary*, 1884. Manager of the Haymarket Theatre, 1887-96; thenceforth proprietor and manager of Her (His) Majesty's Theatre. Knighted 1909. Especially famous for his productions of Shakespeare's plays. Pub. lectures on *The Imaginative Faculty*, and on: *Hamlet from an Actor's Prompt Book*; *Henry VIII. and his Court*; etc. His *Thoughts and Afterthoughts* were pub. in 1913. Naturally adapted to sustain fantastic parts; some of

those he took being: Fagin in *Oliver Twist*, D'Orsay in *The Last of the Dandies*, and Malvolio in *Twelfth Night*. Died suddenly in London, July 2.

Tree-creeper, a small Eng. bird, the *Certhia familiaris*. See CERTHIDÆ.

Tree-fern, a fern with a trunk-like rhizome, somewhat resembling a tree in structure. Many Ts. belong to the genus *Cyathea*.

Tree-frog, a name given to members of the family Hylidæ. They are widely distributed, especially in America, but absent from Britain. The European T. (*Hyla arborea*) is bright leaf-green above and white underneath, and possesses some powers of colour change. The male has a tinge of brown on the throat. The digits bear adhesive discs, with which it readily climbs even up grass. The male croaks loudly, especially on the approach of rain. They are very active insect hunters, and are often kept in fern cases and greenhouses.

Tree-worship, in some form or other, seems to be universal. In Europe, the veneration of trees as sacred objects or the habitat of deities continued to a late date, and we find records of it in many of the accounts of the early Christian missionaries in the N. The veneration of the sacred oak was a leading feature of the Prussian religion, and all know that the same tree and its parasite the mistletoe were venerated by the anc. Britons. In Lithuania this form of worship continued down to the fourteenth century. T. falls into two divisions. In the more primitive form the tree is itself considered as an animate being. In the later and more common form it is considered as the residence of a being which can detach itself at will, but whose fortunes are sometimes bound up with those of the tree. See Frazer's *Golden Bough* (2nd ed.), 1900.

Trefoil, the name given to various three-leaved plants. More than twenty British species belong to the genus *Trifolium*. Bird's-foot Ts. are included in the genus *Lotus*.

Trefouret, Jeanne Alfredine, see HADING, JANE.

Treitschke, Heinrich Gotthard von (1834-96), a Ger. historian and publicist, author of the *History of Germany in the 19th Century*. As a young man his political inclination was towards the Left, but as he grew older he became reactionary. For many years he sat in the Reichstag. He was latterly a strong advocate of Pan-Germanic doctrines, and a patriot of a very uncompromising character. His writings, together with those of Bernhardi (q.v.) and Clausewitz (q.v.),

were widely quoted in the Allied Press during the Great War, to point the moral of the Prussian doctrine of might against right. His collected writings were pub. at Leipzig in 1907. See *Treitschke, his Life and Works*, trans. into Eng. 1914; also *What We Demand from France*, 1870; *The Organisation of the Army*, 1914. See H. W. C. Davies, *The Political Thought of Heinrich von Treitschke*, 1914.

Trelawny, Sir Jonathan (1650-1721), an Eng. divine, held successively the bishoprics of Bristol, Exeter, and Winchester. In 1688 he was numbered among the seven bishops tried under James II. for refusing to conform to the Declaration of Indulgence, but was acquitted. He is the hero of R. S. Hawker's ballad, *And shall Trelawney Die?*



E. J. TRELAWNY

Trelawny, Edward John (1792-1881), an Eng. traveller and man of letters. His early life was spent in India, but in 1822 he met Shelley and Byron in Italy, and after Shelley was drowned he was present at the cremation of the body. In 1823 he went with Byron to take part in the Gk. struggle for independence. In 1835 he pub. an autobiography, *Recollections of a Younger Son* (new editions, 1890 and 1925), and then in 1858 followed his *Recollections of Shelley and Byron*, republished in 1878 as *Records of Shelley, Byron, and the Author* (a new edition by E. Dowden, *Recollections of the Last Days of Shelley and Byron*, appeared in 1906). See *Letters*, ed. by H.

Buxton Forman, 1910; also H. J. Massingham, *The Friend of Shelley, a Memoir of Trelawny*, 1930.

Trematodes, a class of flat worms, with an oval non-segmented body. Many of them are parasitic, and among the most important are *Distomum hepaticum* and *D. lanceolatum*, which cause liver fluke (*q.v.*) in sheep and other ungulates, also *Amphistomum Collinsi* and *Gastrodiscus Egyptiacus*, both of which infest the intestines of horses, and *Bilharzia crassa*, a blood parasite of cattle and of man in the tropics.

Tremolite, see AMPHIBOLE.

Trench, Frederick Herbert (1865-1923), Irish poet, *b.* in Co. Cork. Educated at Haileybury and Keble College, Oxford. He was a fellow of All Souls's College and an examiner on the Board of Education. His first poems, *Deirdre Wedded*, were pub. in 1901. As Director of the Haymarket Theatre in 1908 he produced *King Lear* and Maeterlinck's *Blue Bird*. His own play, *Napoleon*, was produced in 1919. Other books are *New Poems* (1907) and *Poems; with Fables in Prose* (1918). *Collected Works*, 3 vols., were published in 1924. See A. Chevalley, *Herbert Trench: sa Vie et ses Oeuvres*, 1925.

Trench, Richard Chenevix (1807-86), an Anglican archbishop and poet, *b.* at Dublin. He was professor of divinity at King's College, London (1847-58), dean of Westminster (1856), where he instituted evening nave services, and archbishop of Dublin (1863). His poems show him a gifted disciple of Wordsworth; and *The Study of Words* established his reputation as a philologist. He also pub. *Notes on the Parables* and *Notes on the Miracles*; and he gave the first impulse to the great Oxford *New English Dictionary*.

Trenck, Friedrich von der, Baron (1726-94), a Prussian officer; when only sixteen years of age he became a cadet in the bodyguard of Frederick the Great. He was soon promoted, and distinguished himself in a campaign against Austria; but his intrigue with Princess Amela of Prussia led to his imprisonment in the citadel of Glatz in 1745. He, however, effected his escape and entered the Russian service. In 1745 he was again arrested and imprisoned in the fortress of Magdeburg, and was only set at liberty in 1763. He afterwards pub. *Sämmtliche Gedichte und Schriften* and *Merkwürdige Lebensbeschreibung*. T. was ultimately guillotined in Paris.

Trendelenburg, Friedrich Adolf (1802-72), a Ger. philosopher, *b.* at Eutin, near Lübeck, and educated at Kiel, Leipzig, and Berlin universities, being professor at the

last-named from 1833 till his death. Chief work, *Naturrecht*; also pub. *Elementa logicae Aristotelicae, Logische Untersuchungen*, etc. See Lives by Bonitz (1872) and Kleinert (1872).

Trengganu, an unfederated state of the Malay Peninsula. It was ceded by Siam to Britain in 1909. Its chief industry is fishing, and it has also tin mines. The cap. is Kuala Trengganu, pop. 12,456. Area of state, 5500 sq. m. Pop. (1921) 153,456.

Trent, the third most important riv. of England, rising in Staffordshire and flowing through the counties of Derby, Leicester, Nottingham, and Lincoln, eventually joining the Ouse to form the Humber. It is about 170 m. long, and is connected with other rivs. by canals. The chief tns. on its banks are Nottingham, Newark, and Burton-on-Trent. The chief tributaries are the Idle, Tame, Dove, Derwent, and Sow.

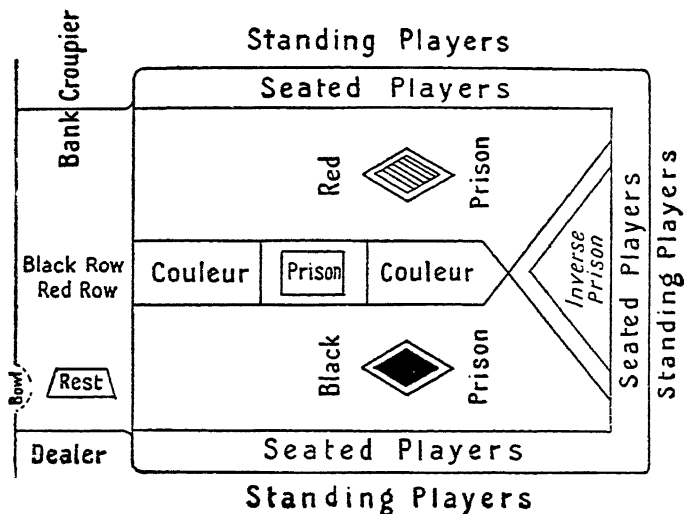
Trent, or Trento, a tn. of the Tyrol, Italy, stands in a beautiful situation on the Adige. T., the anct. *Tridentum*, has embattled walls and a large ruined castle. It is the seat of a bishop and has a splendid marble cathedral. In its former church of Sta. Maria Maggiore the famous Council of T. (*q.v.*) sat. T. is noted for its manufactures of silk, pottery, playing-cards, and wine. It passed from Austria to Italy after the Great War. Pop. (1928 est.) 62,183.

Trent, Council of, the 19th ecumenical council of the Church. It was convoked by Pope Paul III. in 1545 to restore peace to the church, then distracted by the teaching of Luther and other reformers. It sat till 1563 and passed a number of decrees defining doctrines questioned by the Protestants and reforming abuses. These were confirmed by papal bull in 1564.

Trente-et-Quarante, or *Rouge-et-Noir*, is played with six packs of cards on a table (see diagram) marked out for the game. The cards having been shuffled, one of the players cuts, and so many cards are dealt out face upwards in a row, until the sum of the pips exceeds 30 in number. The court cards and tens count 10 each, and the aces 1. A second row is then dealt out below the first one, until the pips in this row also exceed 30. The top row (see diagram) is called 'black,' and the second 'red,' the winning row being that which contains the fewer pips. A total of 31 would be the best possible, and 40 the worst possible 'point.' Players can also put their stakes on couleur or inverse. The four even chances, black, red, couleur, and inverse, are played and paid in precisely the same way as the even chances in roulette.

The chances couleur and inverse are decided by the colour of the first card turned up. If the colour corresponds with the colour of the row containing the fewer pips, couleur wins; if with the other row, inverse wins. Playing may be *à cheval*, i.e. on combinations of the above, either on red and couleur or black and couleur, red and inverse or black and inverse. Staking *à cheval* is the same as staking on the line between red and impair, or noir and pair at roulette. If both chances

coloured prison (see diagram), e.g. if he chooses red, and the red chance wins the next coup, he can do as he likes with his stake. If, on the other hand, a second *refait* appears, he must win twice in succession before he can withdraw his stake. If the two rows come out at the same total of any number over 31, the coup is null and void, and the stakes may be removed from the table or not, as the players choose. A *refait* is said to occur once in 38 deals on the average, which, if



Half the Trente-et-Quarante Table (the other half being similarly marked out)

win, the bank pays even money; but if both lose the stake is lost. If one wins and the other loses, the bet is 'off,' and the player may either take his stake up or leave it for the next coup. Where both rows total 31, the result, which is called a *refait*, is analogous to that in roulette when zero appears, i.e. the stakes are put *en prison*, and after the ensuing deal the stakes on the winning chances are withdrawn from prison and the others lost. But instead of being put in prison in the first instance, the player may, at his option, as at roulette, halve his stake with the bank. If, however, the player chooses to go into prison, he has the option to choose the prison before the next deal; and if he selects the right

true, would give the bank a slightly less advantage than at roulette, where it is 1 in 37. Again, the odds against black and red both totalling 31 are 81 to 1. The punter or 'player,' however, is at liberty to insure against the *refait* by paying one per cent. on his stake; but no premium under 5 francs is accepted by the bank. The effect of insuring is that, if the *refait* appears, the punter's stake does not go into prison, and he is at liberty to remove it. The maximum stake allowed is 12,000 francs, and the minimum 20 francs. The stakes are usually far heavier than at roulette, owing to the belief that the bank's advantage is not so great as at the other game. In reality, it is greater, because, as the insurer is paying one

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within ten days after delivery of notice of T. apply for an order at chambers to have a jury. If neither applies, the master can make what order he deems fit. County court actions may be tried before a judge and jury of eight men, or before a judge alone (*see* COUNTY COURT, INFERIOR COURT). The right to begin at a trial depends upon the mode of raising the issues on the pleadings so far as actions for debt or liquidated (*i.e.*, certain or fixed) damages are concerned. The plaintiff will ordinarily begin in order to substantiate his affirmative pleas, but the defendant may gain the right if his defence contains none but affirmative pleas. In actions for unliquidated actions (which, generally speaking, include all those in which parties can demand a jury as of right) the plaintiff is always entitled to begin irrespective of whether the burden of proof lies upon the defendant. The right is a formidable one in a jury action, as the 'last word' (unless the other party calls no witnesses) rests with him who begins. It is a right of no great value where the judge sits alone. For the rules of evidence at a T. and the difference between examination-in-chief, cross-examination, and re-examination. *see* under EVIDENCE, EXAMINATION, and LEADING QUESTION. An application for a new trial may be made on several grounds: *e.g.* misdirection by judge, misreception of evidence, misbehaviour of the jury, excessive damages. Such application is made by notice of motion to the Court of Appeal within eight days after the T. Criminal Ts. in England at assizes (including the Central Criminal Court) and quarter sessions are held before a judge and jury. Petty offences are tried before a bench of justices of the peace or a stipendiary magistrate.

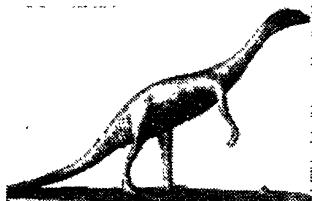
Trial by Combat, or Wager of Battle. This mode of trial, which was introduced into England by the Conqueror, was resorted to in civil actions, 'appeals' of felony, and cases before the Court of Chivalry. In civil cases, to avoid the possible loss of one of the parties, the duel was fought by hired champions, but in military cases the parties themselves fought until one was slain or gave in (when he was put to death unless the king intervened). Where the blood relations of a murdered person 'appealed' (meaning in this sense accused) the supposed murderer, the latter, where the accuser was not a woman, child, priest, or infirm person, could claim T. by C. with his accuser. The accused was hanged if vanquished, but if he killed his accuser or prolonged the fight from

sunrise till dark he was acquitted. Owing to the principle of Eng. jurisprudence that no law can be abrogated by mere desuetude, one Abraham Thornton, accused of murder in 1817, revived this archaism of chivalry and challenged his accuser to T. by C. The 'appellant' declined, and Thornton had perforce to be discharged. T. by C. was then hastily abolished by statute.

Trianon, Treaty of, between the Allies and Hungary, signed June 4, 1920. The principal effect of the treaty was to reduce considerably Hungary's territory. The northern portion went to Czechoslovakia and the southern to Yugoslavia, whilst Hungary retained the middle portion. The Covenant of the League of Nations forms part of this treaty as in the case of the Treaty of Versailles (*q.v.*). The independence of the following states was recognised—Serb-Croat-Slovene and Czechoslovak. The independence of Hungary was made inalienable otherwise than with the consent of the League of Nations. Hungary renounced all claim over territory outside Hungary which formerly belonged to Austria-Hungary. There is already a considerable literature on this treaty. *Consult* Eot-tevengi on cultural effects (1928); Fodor on the geographical aspects (1928); Földes on the effect on Hungarian economics (1928); Horvath on the diplomatic history (1928); Latacs on the injustices wrought by the treaty (1928); Sir L. Scott on the claims of Hungarian nationality (1927); and Vlaskies on amendments (1928); and Berzeviczy, *The Treaty of Trianon and Disarmament* (1928).

Triassic System, in geology, is the first of the three rock systems of the Mesozoic period. It constituted the upper half of the original New Red Sandstone before the elimination of the lower half as the Permian (*q.v.*) or Drassic system. The system shows three distinct lithological types, viz.: (1) the marine facies of the Alpine Trias; (2) the semi-marine and semi-continental facies of the Ger. Trias; and (3) the continental facies of Great Britain, S. Africa, etc. The three members of the original Ger. T. system were named Bunter or variegated sandstones, Muschelkalk or shelly limestone, and the Keuper or marly beds. In Britain, only two members of the series are developed, the Bunter and the Keuper, and the system attains its greatest development in Cheshire and Warwickshire (about 2000 ft. thick). The Bunter or Lower Trias is made up of the Upper and Lower variegated sandstones with the intermediate pebble beds, and the Keuper or Upper Trias

consists of the Keuper marls and waterstones. The Bunter and Keuper are practically barren of fossils, but the latter affords beds of gypsum and rock salt as well as building stone. A large part of Germany is occupied by Triassic rocks, the Bunter affording beds of dolomite and the Keuper local seams of coal (Lettenkohl) and beds of gypsum. The middle member of the Ger. Trias—the Muschelkalk—is very rich in fossils. The British and Ger. Trias were probably laid down in irregular basins, and the Muschelkalk of Germany must have been formed when the waters of the Ger. basin were in communication with the open sea. The grand development of the marine facies of the Triassic in the E. Alps consists of thick bedded limestones, dolomites,



A TRIASSIC VERTEBRATE
Aukisaurus colorus, one of the earliest dinosaurs

and calcareous shales. The system here is generally divided into four subdivisions, viz. the Alpine Bunter, the Alpine Muschelkalk, the Norian, and the Carinthian, none of which can be individually correlated with the Ger. types, although the range in time is equivalent. The transition beds between the Trias and the Lias (the Alpine Rhaetic beds) can be paralleled with the Rhaetic or Penarth beds of Britain. These beds are very fossiliferous, and are sometimes designated 'Avicula Contorta' beds. The Alpine or marine type of Trias recurs in the Balkans, Apennines, Peru, Himalayas, Alaska, and Japan. The continental type of Triassic occurs in S. India, S. Africa, and in parts of N. America. The life of Triassic time was rich and varied. The animals include fishes (Dipnoids), amphibia, and all classes of reptiles. Pecos, conifers, and cycads represented the plant life of the time, and the invertebrata embrace all classes. Lamellibranchs, gasteropods, cephalopods, and crinoids were most abundant, and the Muschelkalk is rich in their remains.

Tribonian (d. A.D. 545), a Byzantine jurist and official, b. in Paphlagonia.

He superintended the compilation of the *Pandects, Institutes*, and new code of Justinian.

Tribonian, Gaius (d. 43 B.C.), was the promoter of the *Lex Trebonia*, proposing Pompey for the two Spains, Crassus for Syria, and Caesar for the Gauls and Illyricum. He was governor in Further Spain in 47 as propraetor, but was expelled from the prov. by a mutiny of the soldiers. In 45 he was raised to the consulship by Caesar, but was one of the prime movers in the conspiracy to assassinate him. He was slain by Dolabella.

Tribune (Lat. *tribunus*), the name given to officers of various descriptions in the constitution of auct. Rome. Of these the most important were the *tribuni plebis*, or Ts. of the commons. At first their power was small and they were only two in number, but soon they became formidable and not only preserved the rights of the people, but could summon assemblies, propose laws, stop the consultations of the senate, and even abolish its decrees by their vote. Their consent was also necessary for the confirmation of the *senatus consulta*, and if any irregularity happened in the state their power was almost absolute, for they could even imprison a consul if he acted so as to disturb the peace of Rome. Again, their persons were held sacred, and to interrupt them while speaking was a punishable offence, while to strike them was a crime. But their power was undermined by Sulla. Pompey and Cotta, however, restored their privileges and the office remained in full force until the time of Augustus, who conferred the power and office upon himself to make himself more absolute. It was totally abolished by Constantine. The fixed number of Ts. was ten. Amongst other officers bearing the title were: (1) The *tribuni militum*, who commanded a division of the legions. (2) The *tribuni cohortium praetoriarum*, who were entrusted with the person of the emperor. (3) The *tribuni aeriarii*, who kept the money to defray the expenses of the army. These latter were abolished by Julius Caesar, but re-established by Augustus, who added to their number. (4) The *tribuni volupatium*, who had charge of the amusements which were prepared for the people.

Trichinopoly: (1) A dist. of Madras, India, with an area of 4935 sq. m. and a pop. of 2,107,000. (2) Cap. of the above dist., stands on the Cauvery R. It is a fortified tn., encircled by walls, and its inhabitants (120,422) are noted for their manufacture of jewellery, cutlery, and cigars. Here is a celebrated temple.

Trichinosis, or **Trichiniasis**, a disease caused by the presence of the parasitic nematode *Trichina spiralis*, which is found chiefly in man, the pig, and the rat, but also in the dog, cat, rabbit, etc. The parasite finds its way into man from infected pork which has not been properly cooked. The young forms are found encysted in the muscular fibres of the pig, and when the cysts reach the intestines, the solution of the calcified capsule sets free the parasites, which grow rapidly and reproduce in enormous numbers. The young trichinae then develop and bore through the intestinal walls, ultimately reaching the muscles, where they become encysted by the secretion of lime salts. They are then quiescent, and can only further develop by reaching the intestines of another host. The acute symptoms of the disease are caused by the migration of the trichinae from the intestines. The early indications are nausea, fever, and loss of appetite; later on exhausting diarrhoea may occur, together with delirium, swollen eyelids, and tenderness and pain in the muscles. The most decisive symptom is a pronounced leucocytosis marked by eosinophilia. The treatment should include purgatives if the diagnosis is made in the early stages, otherwise this expedient is contra-indicated, as all efforts must be directed towards avoiding exhausting the patient.

Tri-chromatic Printing, see **PRINTING** and **PROCESS WORK**.

Triclinium, a Rom. word used to designate the company disposed on the three couches that were usually placed at table for the guests; each of these couches was so made as to seat three persons. The word was used in this sense as a figure of speech, but it also more directly meant the room itself in which banquets were held, and the table and three surrounding couches. The houses of rich Roms. were fitted with several *triclinia* to be used according to the different seasons of the year.

Tricolor, see **FLAG**.

Tricoups, **Spiridon** (1788-1873), a Gk. author and statesman, studied in Paris and London, and became secretary to Lord Guilford in the Ionian Isles. During the Gk. War of Independence he occupied various important positions, and in 1832 was minister of foreign affairs. He was thrice envoy-extraordinary to London, and in 1850 was minister to Paris. He was a friend of Byron, whose funeral oration he pronounced. His chief work was his *History of the Greek Revolution*, 1853-57. His son, *Charilaos Tricoups* (1832-96), became a foreign minister at the age of thirty-

four, and prime minister 1886-90 and 1891-93. His policy was to develop the resources of his country so as to create an army and a fleet, but the circumstances of the time did not allow his schemes to be carried into effect. He was the foremost Gk. statesman of his time.

Tricuspid, see **HEART**.

Tricycle, see **CYCLES** and **CYCLING**.

Tridacna Gigas, see **CLAM**.

Trident, in classic mythology, is used as the symbol of Neptune's sovereignty over the sea. It consisted of a staff, armed at one end with three short prongs, with double barbs at the points. We meet with the T. on ancient coins, such as those of Saguntum, and on the Sicilian coins of Hiero. Britannia carries a T. also to represent sovereignty over the sea.

Triennial Acts. The object of these Acts, passed in 1641 and 1694, was to ensure the frequent meeting of parliament. Charles I. ruled for eleven years without summoning a parliament; the result was that the Long Parliament passed the first Triennial Act, 1641, empowering the Chancellor, or in default the Peers, to issue the necessary writs, if the king failed to call a parliament for three years, or in the last resort, allowing the electors to proceed to choose their representatives. The Act was repealed in 1664 by an Act which provided that parliament must not be intermitted for more than three years. In 1694 William III. assented to the second Triennial Act, which followed upon the declaration in the Bill of Rights that 'parliament ought to be held frequently.' In 1716 the triennial limit was increased to seven years. That period was reduced to five years by the Parliament Act, 1911.

Trier (Fr. *Trèves*) a city in the Rhine prov. of Prussia, 48 m. from Metz, on the Moselle, situated in a fertile valley shut in by vine-clad hills. It was formerly the cap. of an archbishopric and electorate of the empire, and is now the seat of a Rom. Catholic bishop. It contains more important Rom. remains than any other place in Northern Europe, notably the picturesque ruins of the Imperial Palace; the Porta Nigra, or Rom. gate, part of the anct. defences of the tn.; the basilica or Palace of Constantine, now an evangelical church; baths, and an amphitheatre. T. has trade in wines, and manufs. machinery. Other industries are tanning, dyeing, glass-painting, and the making of furniture and pianos. T. claims to be the oldest tn. in the Ger. empire. It was important as early as the first century, and during the third and fourth centuries was

frequently the residence of the Rom. emperors. Pop. (1925) 58,140.

Trieste (anc. *Tergeste*), seaport of Italy, formerly the principal seaport of Austria-Hungary, situated on the Gulf of T., at the N. extremity of the Adriatic, 70 m. E.N.E. of Venice. It consists of a new tn. and an old tn. The Via del Corso separates the two portions of the city, which is also intersected by the Maria Theresa Canal. The city is the see of a bishop and the principal port of the Adriatic, having a great commerce in the produce of the Levant. It is the seat of the Lloyd-Triestino Co., formerly the Austrian Lloyd Steamship Company, one of the largest in the world, which has here an arsenal. Ship-building is an important industry, and there are naval and other dock-yards; also an aerodrome and observatory. Here is a university of Economy and Commerce. The principal manufactures are leather, wax, and soap; iron-founding is carried on. The principal articles of export are wool and woollengoods, sugar, paper, machinery, etc., and the imports include cotton and cotton goods, coffee, coal, hides, fruit, cereals, and tobacco. The harbour is a fine one, and has recently been developed and extended. T. was established as a Rom. colony by the name of *Tergeste* in the time of Vespasian. In the thirteenth and fourteenth centuries it was under the government of Venice, and submitted to the Austrian suzerainty in 1382. From 1797 to 1805 it was held by the Fr., and from 1809 to 13 was part of the Illyrian provs. T. was proclaimed an imperial city in 1849. Always a centre of Italian patriotism, it was ceded to Italy in 1918. Pop. (1929) 255,480.

Trifolium, a genus of leguminous plants which includes those collectively known as clover (*q.v.*)

Triforium, in Gothic architecture, the space between the top of the vaulting and the clerestory windows, when opened into the nave by a number of arches, three or less in each bay.

Trigonometry, in its primary meaning, signifies the measurement of triangles; it has a much wider scope, however, embracing all types of geometrical and algebraical investigations by means of certain quantities termed trigonometrical ratios. These ratios are defined as follows: Take any system of rectangular axes OX, OY, and with centre O describe a circle of any radius. On its circumference take any point P. Join OP, draw PM perpendicular to OX. Then the co-ordinates of P are (OM, MP), or in ordinary Cartesian notation

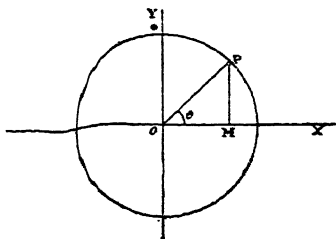
(x, y), where $x = OM, y = MP$. If the angle POM be denoted by θ , then

$$\sin \theta = \frac{MP}{OP}, \quad \cos \theta = \frac{OM}{OP}, \quad \tan \theta = \frac{MP}{OM}, \quad \operatorname{cosec} \theta = \frac{OP}{MP}, \quad \sec \theta = \frac{OP}{OM}, \quad \cot \theta = \frac{OM}{MP}.$$

The terms sin, cos, etc., are abbreviations for sine, cosine, tangent, cosecant, secant, and cotangent. From the above definitions the following relations hold: $\sin \theta =$

$$\frac{1}{\operatorname{cosec} \theta}, \quad \cos \theta = \frac{1}{\sec \theta}, \quad \tan \theta = \frac{1}{\cot \theta}.$$

Also since OMP is a right-angled triangle, $MP^2 + OM^2 = OP^2 \therefore \left(\frac{MP}{OP}\right)^2 + \left(\frac{OM}{OP}\right)^2 = 1$, i.e. $\sin^2 \theta + \cos^2 \theta = 1$. From these, other relations, such as $\sec^2 \theta = 1 +$



$\tan^2 \theta$ and $\operatorname{cosec}^2 \theta = 1 + \cot^2 \theta$, may be deduced. In the construction of tables for the values of the different trigonometrical ratios of θ , the labour of finding these values is greatly minimised by the use of the following relations, it being only necessary to calculate these values as θ takes the various values from 0° to 45° . These relations may easily be proved by reference to diagram, $\sin (90 - \theta) = \frac{OM}{OP} = \cos \theta$, $\cos (90 - \theta) = \frac{MP}{OP} = \sin \theta$,

$$\tan (90 - \theta) = \frac{OM}{MP} = \cot \theta.$$

The following also may easily be deduced: $\sin (90 + \theta) = \cos \theta$, $\cos (90 + \theta) = -\sin \theta$; $\sin (180 - \theta) = \sin \theta$; $\cos (180 - \theta) = -\cos \theta$. Thus $\cos 170 = \cos (90 + 80) = -\sin 80 = -\sin (90 - 10) = -\sin 10$. The addition theorem is useful in finding the values of the ratios of the sum or difference of two angles, the value of the ratios of these angles being known. The theorems are as follows, θ and ϕ denoting the angles:

$$\sin (\theta + \phi) = \sin \theta \cos \phi + \cos \theta \sin \phi, \\ \cos (\theta + \phi) = \cos \theta \cos \phi - \sin \theta \sin \phi.$$

Often an angle is denoted by its trigonometrical ratio; this value is called the inverse function, e.g. $\sin^{-1} \frac{1}{2}$ is the angle whose sine is $\frac{1}{2}$, $\cos^{-1} \frac{1}{2}$ is the angle whose cosine is $\frac{1}{2}$. For

the construction of tables, the sine and cosine functions are expanded into the following series: $\sin \theta = \theta - \frac{\theta^3}{3!} + \frac{\theta^5}{5!} - \dots$

$\dots ad inf., \cos \theta = 1 - \frac{\theta^2}{2!} + \frac{\theta^4}{4!} - \dots$

ad inf., where θ is measured in radians. Thus if θ° is value of the angle in degrees, the number of degrees = $\frac{\pi \theta}{180}$

radians. Trigonometry is applied to the solution of triangles. These triangles may be plane or spherical;

the chief relations existing between the sides and the trigonometrical ratios of the angles are: $\frac{\sin A}{a} = \frac{\sin B}{b}$

$= \frac{\sin C}{c}, a^2 = b^2 + c^2 - 2bc \cos A$, etc.,

where A, B, and C denote the angles, and a, b, c the sides opposite to these angles. In spherical triangles

$\frac{\sin A}{\sin a} = \frac{\sin B}{\sin b} = \frac{\sin C}{\sin c}, \cos a = \cos b \cos c$

$+ \sin b \sin c \cos A; \cos A = -\cos b \cos c$

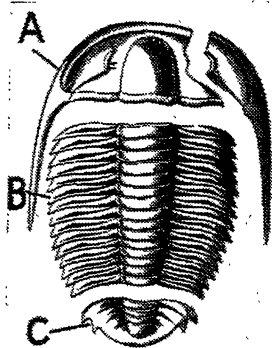
$+ \sin b \sin c \cos a$, the A, B, C, and a, b, c having the same significance as before. The subject arose out of the study of astronomy, the Gk. astronomer Hipparchus (160 B.C.) inventing it. The man who greatly extended the subject was Ptolemy, the Alexandrian astronomer. Regiomontanus made the subject a science quite independent of astronomy. See Todhunter, *Plane Trigonometry*, 1903; Todhunter and Leatham, *Spherical Trigonometry*, 1907; J. A. Bullard and A. Kiernan, *Plane and Spherical Trigonometry*, 1923; J. B. Rosenbach and E. A. Whitman, *Plane Trigonometry*, 1929; B. C. Molony, *Numerical Trigonometry*, 1930.

Trikkala, a tn. of Greece, cap. of the prov. Trikkala, 38 m. S.W. of Larissa. It is a centre of trade in wheat, maize, tobacco, and cotton, and the see of an archbishop. Pop. 25,000.

Trillium, a genus of perennial plants (order Liliaceæ), with thick rhizomatous stems and roots, and a solitary nodding white, pink, or purple flower borne in the centre of a whorl of three leaves. *T. grandiflorum*, the wake robin, is often grown in gardens.

Trilobites, in palæontology an order of Crustacea, which are now regarded as an early type from which the living and more specialised Isopoda have arisen. Body more or less distinctly trilobate in a longitudinal direction; there is a cephalic shield, generally with a pair of sessile, compound eyes; the thoracic somites are movable upon one another, and vary greatly in number; the abdominal segments coalesce to form a caudal shield (pygidium), and there is a well-

developed upper lip (hypostome) formed by a doubling of the head-shield. The Ts. are exclusively Palæozoic and range from the Upper Cambrian to the Lower Carboniferous of



A TRILOBITE DISSECTED TO SHOW CHIEF POINTS OF THE ANATOMY

A, The head; B, The Thorax;
C, The tail

Europe and America, attaining their maximum in the Silurian. There are over 500 species known, distributed in many genera, which are further subdivided into some twenty families.

Trilogy, a group of three tragedies which are either connected by a common subject, or each is a distinct story. In Greece everyone who took part in the poetic contest had to produce a T. and a satiric drama. The only surviving example is the *Oresteia* of Æschylus, consisting of the 'Agamemnon,' 'Choephora,' and 'Eumenides.'

Trim, the cap. of co. Meath, Irish Free State, on the R. Boyne. Its chief points of interest are its ruined castle and abbey and a monument to the Duke of Wellington, once a resident. Pop. (1926) 1325.

Trimorphism, see DIMORPHISM.

Trincomalee, a seaport on the N.E. coast of Ceylon, with an excellent harbour. It is the site of the Temple of the Thousand Columns, a pilgrimage resort; reduced to ruins by the Portuguese during the seventeenth century. Pop. 11,100.

Tring, a market tn. of Hertfordshire, England. Here are Tring Park and the Rothschild zoological museum. There is a trade in agricultural produce. Pop. (1931) 4364.

Trinidad: (1) The second largest W. Indian island belonging to Bri-

tain. It lies off the N.E. coast of Venezuela, from which it is separated by the Gulf of Paria. It is immediately N. of the mouth of the Orinoco, and administratively includes Tobago. Area 1862 sq. m. Tobago 114 sq. m. The N.E. and S. coasts are steep and lofty, with few harbours, but on the W. the coast is low, and the Gulf of Paria forms a vast harbour. From the W. the land rises gradually towards the interior, with fertile plains, hills, and valleys. Three mountain ridges traverse the island from E. to W., which may be regarded as continuations of similar ranges in Venezuela, of which T. originally formed part, until detached by some volcanic or aqueous convulsion. The climate is agreeably warm. The principal exports are cocoa, fuel, petrol and sugar, and asphalt is important; coconut oil, rum, and Angostura bitters are manufactured. Bitters and rum are also important exports. One of its features is Lake Brea, or the pitch lake, which contains an enormous supply of asphaltum. The lake occupies 114 acs., and is leased to the Trinidad Lake Asphalt Co., Ltd., for twenty-one years from Feb. 1, 1930, a renewal of an old lease. The oilfields are being developed and the island is now the second largest producer of petroleum in the British Empire. The island is drained by the Caroni, Oropuche (both navigable), Lebranche, Nariva, Guacaro, and the Hortoire. Port of Spain is the cap. The T. Gov. maintains wireless stations at Port of Spain, Tobago, and N. Post. Discovered by Columbus in 1498, T. became British in 1797. Tobago produces rubber, tobacco, cotton, and recently coconuts. Pop. (1929) 403,300, mostly coloured. See C. Reis, *History of the Constitution of Trinidad*, 1929. (2) The cap. of Las Animas co., Colorado, U.S.A., engaged principally in coal-mining. Pop. (1930) 11,700. (3) A city on the S. coast of Cuba, 175 m. S.E. of Havana, exporting sugar and honey. Pop. 13,500. (4) A volcanic island off the coast of Brazil, to which it belongs.

Trinitarians, or Redemptionists, a religious order, founded in France in 1198 by John of Matha and Felix of Valois for the redemption of Christians captive among infidels. The T. followed the rule of St. Augustine.

Trinitrotoluene, 'T.N.T.', a high explosive, $C_7H_5(NO_2)_3$, largely used in the Great War. It is a pale yellow crystalline solid, m.p. $81^\circ C$, prepared by acting upon toluene (q.v.) with a mixture of concentrated sulphuric and nitric acids.

Trinity, in theology, the term used for the highest mystery of the Chris-

tian faith, the doctrine that God, while being one in nature, is three distinct persons, viz. the Father, the Son, and the Holy Ghost. In the O.T. this doctrine cannot be said to hold a prominent place, for the Jews had to learn the unity of God as opposed to polytheism. Not even in the N.T. is the doctrine of the Blessed T. found in its fully developed form. This development was the work of the early centuries and its expression owes most of all to Gk. thought. The Christological problem was first discussed, and the original Nicene Creed ended at the words 'And I believe in the Holy Ghost.' The latter part was added afterwards, and now the expression of the mystery was almost complete. The fullest expression, however, is found in the *Quicumque Vult*, the so-called Creed of St. Athanasius. See HOLY SPIRIT or HOLY GHOST.

Trinity College, Cambridge, was founded in 1546 by King Henry VIII. on the site of the two colleges of Michael House (founded 1324) and King's Hall (founded 1337). It was founded for a master and sixty fellows, but the endowment was considerably increased by Queen Mary. It is now the largest college in the University. There are numerous scholarships and exhibitions. See W. W. Rouse Ball's *Trinity College*.

Trinity College, Oxford, was originally founded and endowed by Edward III., Richard II., and the priors and bishops of Durham. At the Reformation it was suppressed, but a new college was founded in 1554-55 by Sir Thomas Pope. This is the present college. The original foundation was for a president, twelve fellows, and twelve scholars, these last to be chosen, if possible, from the founder's manors.

Trinity House, the name of five maritime societies, of which only one, the 'Corporation of Trinity House of Deptford Strond,' London, retains its anct. powers and privileges. The others, at Leith, Dundee, Hull, and Newcastle-on-Tyne, dwindled to mere benefit societies. The London House, however, still retains the management of some of the most important interests of the seamen and shipping of England. Its corporation consists of a master, deputy-master, and thirteen elder brethren, two Royal Navy and eleven Merchant Service, two of whom sit as Nautical Assessors in the Court of Admiralty in cases where any question upon navigation is likely to arise. There are also many younger brethren.

Trinity Sunday, according to the Western calendars, the first Sunday after Pentecost, or Whitsunday, observed by the Rom. Catholic and

Anglican Churches. It falls upon the octave of Pentecost as the day kept in honour of the third person of the Trinity. The corresponding Sunday in the Gk. Church is called *All Saints' Sunday*. The Anglican Church names the Sundays succeeding T. S., until Advent, *first, second, etc. Sunday after Trinity*, while the Rom. Catholic Church reckons these Sundays from Pentecost.

Trinobantes, an ant. British tribe who were seated N. of the Thames, having London for their capital. In A.D. 43 and A.D. 61 they were overthrown by the Romans.

Triphenylmethane, $\text{CH}(\text{C}_6\text{H}_5)_3$, is obtained by the action of benzal chloride, $\text{C}_6\text{H}_5\text{CHCl}_2$, on benzene, in presence of aluminium chloride; or from benzaldehyde and benzene in conjunction with zinc chloride. It forms colourless prisms melting at 93°C . and boiling at 359°C . It is the parent substance of a number of dyes. Thus by the condensation of benzaldehyde and dimethylaniline with zinc chloride, leucomalachite green is obtained (the leuco base), which, on oxidation with lead dioxide and hydrochloric acid, gives rise to the colour base (a carbinol), and this loses water to give the dye *malachite green*. *Crystal violet* is another example. *Pararosaniline* can be made by the condensation of paratoluidine (1 mol.) and aniline (2 mols.) in presence of arsenic acid. *Rosaniline* is similarly obtained from a mixture of ortho- and paratoluidines. In each case the colour base formed loses water to give the dye.

Triple Alliances. The first was ratified between the States-General and England against France in 1668 for the protection of the Spanish Netherlands. It was afterwards joined by Sweden, thus forming a T. A. Another was arranged in 1717 between England, Holland, and France against Spain, but after the accession to it of Austria in 1718 it was known as the Quadruple Alliance. In 1788 England, Prussia, and Holland allied, and in 1795 England, Russia, and Austria. About 1883 an alliance was arranged between Germany, Austria, and Italy to check the power of Russia and France. Although this T. A. expired in 1892, it was renewed and extended for a number of years, and this, together with the dual alliance between France and Russia and the triple entente between England, France, and Russia, was relied upon to preserve the balance of power between the great nations of the world. The T. A. was last renewed in 1912 and it bound Italy to the Central Powers in a defensive alliance. Italy had first joined it in

1882 in a secret treaty, being full of resentment against France for the seizure of Tunis. It obliged Italy, in the event of either or both of her allies, 'without direct provocation on their part,' being attacked by another power, to join in the war against the attacking power. If either ally were forced to declare defensive war against a great power which threatened its security, the other members of the T. A. would either join in the war or maintain a benevolent neutrality towards their ally. But during the Great War Italy's initial neutrality became gradually less 'benevolent,' and eventually on May 4, 1915, Italy denounced her treaty of alliance with Austria-Hungary. See further under ITALY; also EUROPE; WAR, THE GREAT.

Tripolis, a tn. of Syria in the Lebanese Republic, about 2 m. from the sea. Its port is El Mina. In 1109 it was taken by the Crusaders. Pop. 37,260.

Tripolitania, a prov. of Libya, an Italian territory of Northern Africa, stretching from the Mediterranean some 800 m. into the Sahara Desert. Tunis and Algeria lie to the W., and the Libyan prov. of Cyrenaica to the E. The greater part of the coast-line is low and sandy, and thus quite unfit for harbourage. There are no rivs. of importance. The country is flat near the coast, but there are low mountain ranges in the W., centre and S. There are fisheries for sponges and tunny along the coast, but T. is almost an entirely agricultural country, possessed of no minerals but salt, which, however, is of excellent quality and produced in large quantities. Along the coast all kinds of Mediterranean fruit, palms, olives, etc., are produced. Further inland are grown barley and wheat, olives, tobacco, mulberries, figs, almonds, dates, and the vine. Here is good pastureland, also, for cattle and sheep. It is in this part of T. that Italian colonisation is thickest. Further inland come the dunes, which are being afforested with poplar, pine, acacia and robinia; next comes the mountain dist., which produces vines, figs, and olives. The sub-desert zone, further inland yet, produces only alpha, a source of cellulose, and further S. still is the desert itself, barren save for fertile oases. Before the abolition of the oversea slave trade, the principal commerce was in negro slaves for the mainlands of Turkey. The chief exports now consist of tobacco, salt, barley, esparto grass, ostrich feathers and sponges. Its chief imports are food-stuffs, cotton and metal goods. There is an important caravan trade with

the Central Sudan. About 144 m. of railroad are centred on Tripoli, the capital and chief port. Other tns. are Misurata and Homs.

Government.—During the sixteenth century T. came under Turkish rule, and in 1835 was made into a vilayet of the Ottoman empire. In Sept. 1911, however, Italy, which had long been dissatisfied with its relations with Turkey, issued an ultimatum, which was immediately followed by war. The tn. of T. was blockaded, and in the beginning of October the whole territory was annexed. This annexation was recognised by the Treaty of Ouchy in Oct. 1912. T. is now being administered under the Colonial Ministry. The Italian policy of energetic development met with a severe check at the beginning of the Great War, when there was a general rising of the natives. Not until the governorship of Giuseppe Volpi, 1921-25, was order thoroughly restored. In 1919 the W. frontier was fixed by arrangement with France, and in 1928 effective occupation was greatly extended S. Its area is estimated at 347,400 sq. m., and its pop. at about 550,000 natives and (1931) 20,716 Europeans. See H. M. de Mathuisieulx, *La Tripolitaine d'hier et de demain*, 1913; W. K. McClure's *Italy in North Africa*, 1913; Vico Mantegazza, *La Tripolitania*, 1913; F. T. Marinetti, *La Battaglia di Tripoli*, 1912; E. Camevari, *La Tripolitania*, 1924; G. E. Simpson, *The Heart of Libya*, 1929.

Tripolitza, the cap. of Arcadia, Greece, is seated in a plain at an altitude of 3000 ft. above sea-level. It was utterly destroyed by Ibrahim Pasha in 1825. Pop. (1928) 14,397.

Tripos, **The**, the final examination for the honours degree at Cambridge University. The name recalls the three-legged stool (Gk. *τρίπους*) on which an 'old bachelour' sat when the senior bachelor for the year propounded to him two questions. The T. examination is taken in more than one subject, each course of study having two parts which may be interchanged. The first part is devised as a two-year course and the second generally as a one-year course; so that the T. may be taken in two parts over the ordinary three years' residence at Cambridge. If, however, the student takes the T. after two two-year courses, a residence of four years is ordinarily necessary.

Triptolemus was, according to Gk. legend, the son of Celeus and Metaneira, who dwelt in Eleusis. In return for the loving kindness of Demeter, T. founded her worship in his native city, besides promoting husbandry.

Triptych (Gk. *τρίπτυχος*, threefold), a tablet, often used as an altar-piece, of three leaves, each painted, and so constructed that the outer two can fold over the face of the central leaf.

Trireme (Gk. *τρίρης*) was the chief galley of the Gks. and Roms. and was the favourite ship in time of war. As its name implies, it was provided either side with three banks of oars, manned respectively by *θρανίται*, *ζύγιοι*, and *θαλάμιοι*. The thranites had the longest, the thalamites the shortest oars, the latter sitting on the lowest tier. The crew numbered about 220, 174 of whom were oarsmen and seventeen sailors.

Trismegistus, see HERMETIC BOOKS, and THOTH.

Tristan, or **Tristram**, the hero of romantic Celtic legend. The scene of the story, which deals with the tragic and fateful love story of T. and the two Iseults, Iseult of Ireland and Iseult of the fair hand, is laid in Ireland and Brittany, but chiefly in Cornwall at the court of King Mark. Modern versions of the tale are Wagner's opera *Tristan und Isolde*, Matthew Arnold's *Tristram and Iseult*, Swinburne's *Tristram of Lyonesse*, and 'The Last Tournament' in Tennyson's *Idylls of the King*.

Tristan da Cunha, the name of a small group of is.: Tristan (inhabitable area, 12 sq. m.), Inaccessible Is., Nightingale Is., and Gough Is. or Diego Alvarez, in the S. Atlantic, 2000 m. W. of the Cape of Good Hope. They are British possessions with a pop. of 130. See K. M. Barrow's *Three Years in Tristan da Cunha*, 1911.

Tristan da Cunha (d. c. 1536), a Portuguese navigator, set out on a voyage of exploration with d'Albuquerque in 1506. Besides discovering the islands which bear his name (q.v.), he took possession of Socotra, and came home richly laden from an expedition against Calicut.

Tristram, see TRISTAN.

Triton, dwelt, according to Gk. legend, at the bottom of the sea with Poseidon and Amphitrite, his father and mother. He is represented as human to the waist and dolphin below, usually in the act of blowing a shell to calm the seas.

Triumph, the highest honour accorded to a victorious commander among the Roms. Only a dictator, consul, or praetor holding the imperium or highest command was entitled to the distinction, and then only after success in true warfare, not rebellion, civil strife, etc. The honour with necessary expenses was granted by the senate, who assembled outside the city to receive the victorious general, still in command. The celebration took the form of a procession

to the Capitol through the city; the streets were decorated with garlands, and the procession, headed by the senate and state officials, passed through crowds of spectators, who greeted it with cries of 'Io triumphe.' After the head came trumpeters, then the spoils and trophies, and the crowns presented to the general by provincial tns. Following these came the sacrificial bulls, captives in chains, lictors, musicians, and priests. Immediately behind was the triumphal car, gilded, garlanded, and drawn by white horses; in this stood the general wearing the garb of the Capitoline Jupiter, the purple *tunica palmata*, and *toga picta*, the former decorated with palm shoots, the latter with golden stars. An ivory sceptre surmounted by a golden eagle was carried in the left, a branch of bay in the right hand. Over his head a slave held the golden crown of Jupiter. Then followed the soldiers. Arriving at the Capitol, solemn sacrifice was made, and general festivity followed in the city. When the senate refused to authorise a T., the general might undertake one on his own account to the temple of Jupiter Latiaris, or he might be granted an ovation (q.r.).

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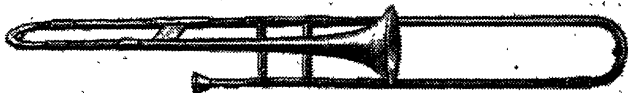
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rayan, he never questions the bases of society. Acute sensations are rare; but the end of his villain in *The Prime Minister*, 1876, beats the end of Carker the Manager in Dickens's *Domby and Son*. T.'s gamblers and ne'er-do-wells edify (especially in *The Way We Live Now*, 1875), not by tragic endings, but by quietly narrated day-to-day absurdity. T.'s *Autobiography*, written about 1875, appeared 1883. Other works include *The Kellys and the O'Kellys*, 1848; *La Vendée*, 1850; *The Three Clerks*, 1858; *The West Indies and the Spanish Main*, 1859; *Castle Richmond*, 1860; *Orley Farm*, 1862; *North America*, 1862; *Rachel Ray*, 1863; *Can You Forgive Her?* 1864; *Miss Mackenzie*, 1865; *The Belton Estate*, 1866; *The Claverings*, 1867; *Nina Balatka*, 1867; *Linda Tressel*, 1868; *He Knew He*

Tromp, Cornelius van (1629-91), a Dutch admiral, a son of Martin H. T. With Opdam he shared in the defeat at Solebay (1665), but in 1673 he held his own against the combined Fr. and Eng. fleets.

Tromp, Martin Harpertzoon (1597-1653), a Dutch admiral, defeated a Spanish squadron off Gravelines in 1639, and the same year captured thirteen richly-laden merchantmen from Portugal and Spain. But in England his name is respected for the many lances he broke with Blake in 1652-53. In June 1653 he was worsted off the N. Foreland, and in July he received a mortal wound during a fierce struggle with Monk.

Tromsø, the cap. of the dist. of Tromsø, in the N. of Norway, on an island of the same name. It is the chief port for Spitzbergen, and the



TROMBONE

Tenor trombone in B \flat . Early eighteenth century

Was Right, 1869; *The Vicar of Bullhampton*, 1870; *Ralph the Heir*, 1871; *The Eustace Diamonds*, 1873; *Australia and New Zealand*, 1873; *Phineas Redux*, 1874; *The American Senator*, 1878; *South Africa*, 1878; *John Caldwell*, 1879; *Cousin Henry*, 1879; *Thackeray* (in the English Men of Letters Series), 1879; *The Duke's Children*, 1880; *Ayala's Angel*, 1881; *Mr. Scarborough's Family*, 1883; *An Old Man's Love*, 1884. In the 'fifties he wrote a comedy, *The Noble Jilt*, pub. 1923. See biography of T. by T. H. S. Escott, 1913; also M. Sadleir, *Trollope: a Commentary*, 1927, and *Trollope: a Bibliography*, 1928; H. Walpole, *Anthony Trollope* (Eng. Men of Letters Series), 1928.

Trombone, originally called the **Sackbut**, a brass wind instrument, which is in reality a trumpet of deep tone. It consists of a long tube, bent twice upon itself, the centre section of which is double, an inner tube sliding backwards and forwards within an outer one. By means of this every sound in the diatonic and chromatic scales within its compass is obtained in perfect tune. There are three kinds of T., the *alto*, the *tenor*, and the *bass*, and these in orchestral music are generally used together.

Tromometer, see SEISMOGRAPH.

seat of a bishop. The chief occupation is whaling. Pop. (1920) 10,071.

Trondhjem (renamed by the auct. name *Nidaros*), the third commercial port in Norway, and former cap., lies at the mouth of the Nid, on Trondhjem Fjord, 84 m. E.N.E. of Kristiansund. It has grown greatly in recent years. Herrings and other fish, deals, copper, and train oil are the staple exports, and shipbuilding, fish-curing, and the manuf. of paper and machinery are local industries. Broad thoroughfares pass between rows of wooden houses. Since earliest times the coronation of the kings of Norway took place in the cathedral, which is one of the most celebrated in Scandinavia. The importance of T. began to wane after the Reformation. Pop. (1920) 55,030.

Troon, a municipal burgh and port of Ayr County, Scotland. Pop. (1931), 8544. Principal industry shipbuilding.

Troop, in cavalry, a captain's command. Each squadron is divided into a certain number of Ts., usually into four, each containing about thirty-two men. It is the cavalry unit in manoeuvres. If there are only two Ts. in a squadron, the number of

sabres in the T. is proportionately increased.

Trophy (from Gk. *τρόπαιον*, and *τρέφειν*, to rear) was in classical times a memorial of victory set up at the spot where the enemy had turned. Shields, helmets, or standards were hung on an oak or olive and, as they were dedicated to Zeus *Tropæus*, it was a sacrilege to remove them.

Tropical Medicine. Owing chiefly to climatic conditions, many diseases rare or unknown in temperate and colder regions are common in the tropics. The tropical climate favours a great variety of parasites causing serious diseases in man. The parasites are transmitted directly from man to man by food and drinking water contaminated with faeces; by water harbouring parasites discharged from snails; by water containing crustacea infected with parasites or by blood-sucking insects which inoculate parasites when they bite. Other tropical diseases such as *berl beri* are due to deficiencies in diet, to unwise exposure to the sun, and to animal and vegetable poisons. *Anct.* Egyptian and Indian records show some knowledge of T. M., and the extraction of the guinea-worm was known to Moses, but the scientific study of the subject may be regarded as beginning in the sixteenth century, a result of explorations and the establishment of communication between the Old World and the New. This led not only to the discovery, but also to the dissemination, of diseases hitherto unknown to Europeans. The literature of T. M. began during last century, and has subsequently grown considerably. The invention of the microscope made possible the identification of minute parasites and the study of their life histories. It led to the discovery of the causative organisms and transmission of such diseases as malaria (*q.v.*), sleeping sickness, leprosy, and amoebic dysentery. Results of microscopic research were often fully confirmed by experimental infection of the research workers, sometimes with fatal results. The chief diseases due to Protozoa (*q.v.*) are malaria, black-water fever, black fever (*kala-azar*), sleeping sickness (trypanosomiasis) and amoebic dysentery. Tsetse flies, carriers of the trypanosomes of sleeping sickness, are confined to Africa, so that African slaves transported to America failed to establish the disease there. Trypanamide injected in the early stages effects a cure, and may even do so in advanced stages. No effective treatment is known for S. American trypanosomiasis, carried by bugs.

Quinine is a specific remedy for malaria, and antimony compounds for *kala-azar*. Relapsing fevers are caused by spirochaetæ carried by ticks, lice, and the teeth of rodents. The injection of arsenical compounds is an effective treatment. Typhus fevers are divided into three groups according to their transmission by lice, ticks, and mites. Diseases due to filterable viruses are yellow fever (*q.v.*), and dengue, transmitted by mosquitoes, and sandfly fever (*q.v.*), carried by sandflies. Plague, a pandemic disease discovered by Kitasato and Yersin to be caused by *Bacillus pestis*, is transmitted by rat fleas. Serum has been used for treatment and vaccines for protection. Cholera, a water-borne disease, causes serious epidemics with high mortality rate. Treatment consists in maintaining the fluid content of the body by injection of salt solutions, while protection is conferred by vaccines. Leprosy, an anct. disease long considered incurable, was discovered by Hansen (1871) to be due to *Bacillus lepræ*. During the twentieth century, treatment with the derivatives of chaulmoogra, hydrocarpous oil, has been found to effect a cure in the early stages, and in a small percentage of advanced cases. Brilliant research has been carried out in connection with the various parasitic worms causing ankylostomiasis, filariasis, guinea-worm, Bilharziasis (*q.v.*), and other diseases. Antimony compounds are specific for Bilharziasis, and oil of chenopodium in carbon tetrachloride for ankylostomiasis. The advance of T. M. has been accomplished by the devotion and sacrifice of workers too numerous to mention. A very few of the outstanding names are those of Manson, Ross, Laveran, Grassi, Bruce, Reed, Leishman, and Eijkmann. See BACTERIA; CESTODA; ELEPHANTIASIS; EPIDEMIOLOGY; HELMINTHOLOGY; NEMATODES; and PARASITOLOGY. Consult Castellan and Chalmers, *Tropical Medicine*; A. C. Chandler, *Introduction to Human Parasitology*; K. K. Chatterji, *Tropical Surgery and Surgical Pathology*; Manson, *Tropical Diseases*; Sir L. Rogers and J. W. D. Megaw, *Tropical Medicine*; Wenyon, *Protozoology*; James, *Malaria at Home and Abroad*. In the compiling of this article the Ed. wishes to acknowledge the kind assistance of the Royal Society of Tropical Medicine and Hygiene.

Tropine, $C_8H_{11}ON$, a white crystalline solid, m.p. $108^{\circ}C.$, obtained by the hydrolysis of the alkaloid atropine (*q.v.*). It is poisonous, hygroscopic, and optically inactive.

Tropisms, the name applied in

biology to the movements of plants and animals, or parts of them, in response to external stimuli. Thus plant roots will grow towards water (positive *hydrotropism*) and towards the centre of the earth (positive *geotropism*), while plant shoots grow towards the light (positive *heliotropism*) and away from the centre of the earth (negative *geotropism*). Other tropisms are *chemotropism* (towards or away from regions of greater concentration of certain chemical reagents), *galvanotropism* (electrical), *thermotropism* (heat), etc. The tropisms are involuntary and automatic.

Trossachs (*i.e.* bristled territory), a picturesque glen of Scotland, Perthshire, between Lochs Katrine and Achray. This rugged and narrow defile is about 1½ m. in length, and was first rendered popular by Sir Walter Scott in his *Lady of the Lake*.

Trotsk (Gatchina, or Gatchina), a tn. of Russia, situated in a marshy part of the Tsarskoe Selo dist. There are porcelain works and a former royal palace. Pop. 15,000.

Trotsky, Lev (originally **Leiba Davuidov Bronstein**), Russian revolutionary leader; b. Oct. 1879, son of David Leontiyevich Bronstein, a Jew of Poltava, who had become a prosperous farmer at Yanovka near Elizavetgrad in Kherson prov. Leiba's education began at Gromokley, four versts from Yanovka. In 1888 he was sent to live with a relative at Odessa, where he attended the St. Paul Realschule. In 1896 he finished his schooling at Nikolayev, turned Socialist, and broke with his family. Arrested, Jan. 1898. Exiled to Siberia, 1900: in a Moscow prison *en route* he married a fellow-prisoner, Alexandra Lvovna. In the autumn they were placed in the neighbourhood of Verkholsensk in the Lena dist. In 1902 he escaped and travelled through Paris to London, where he assisted Lenin with the periodical *Iskra*. It is said that the passport he travelled with was made out in the name of T., and that that is the origin of his adopted name. To Lenin he seemed too moderate; their association ended 1903. Returning to Russia, 1905, T. joined the St. Petersburg Soviet, arrested *en masse* Dec. 3. In Jan. 1907 he was re-exiled; but at Berezov on the way E. he escaped. In Vienna he issued *Pravda*, a bi-monthly. In 1912-13, war-correspondent in Balkans. When Great War broke out, he went to Zürich, thence to Paris; conducting pacifist propaganda, obnoxious to both sides. Expelled from France and Spain, 1916, lived in U.S.A. till March 1917. Embarked

for Russia, was detained till April 29 at Halifax, N.S., by British. At Petrograd, imprisoned by Kerensky; on whose fall in Oct., T. became Commissar for Foreign Affairs. Chief representative of Russia at Brest-Litovsk. Became Commissary of War, and created Red Army that defeated Denikin, Judenich, Kolchak, and Wrangel. Opposed disastrous Polish War of 1920. Always suspected by Stalin (*q.v.*), T. was deprived of commissaryship, Jan. 1925. Employed as head of various technical boards till autumn of 1927, when he was expelled the Communist Party. In Jan. 1928, exiled to Alma-Ata in Turkestan. In 1929, deported from Russian territory, took up residence in Constantinople. Refused permission to live in England or Denmark, was (May 1931) granted leave to reside in Spain. Books in Eng. include: *History of Russian Revolution*, 1919; *Defence of Terrorism*, 1921; *Problems of Life*, 1924; *Lenin*, 1925; *Literature and Revolution*, 1925; *Towards Socialism or Capitalism?* 1926; *Where is Britain Going?* 1926; *The Real Situation in Russia*, 1928; *My Life*, 1930. See also M. Eastman, *Leon Trotsky*, 1926.

Trotting. This form of horse-racing is peculiarly American, though a great part of the best trotters in the U.S.A. are descended through *Hambledonian* from the Eng. thoroughbred *Messenger*. So popular did T. become thirty years ago in America that it practically equalled the Eng. form of 'running,' and it still holds an important place in that country. The fastest m. trotted in America was by Uhlan (1913) in 1 min. 54½ sec., and the fastest pacing m. by Dan Patch (1906) in 1 min. 55 sec.

Troubadours (Fr. *troubadour* from Prov. *troubador*, through O.F. *trover* and cognate verbs meaning to 'invent' or 'compose'), a class of early poets who appeared in Provence, France. The Ts. were considered the inventors of a species of lyrical poetry, characterised by an almost entire devotion to the subject of chivalric love, and generally very complicated in regard to the metre and rhyme. They flourished from the eleventh to the latter part of the thirteenth century, principally in the S. of France (but also in Aquitaine, Auvergne, Languedoc), Catalonia, Aragon and N. Italy. The most renowned among the Ts. were knights who cultivated music and poetry as a polite accomplishment; but the art declined, and in the later days was chiefly cultivated by an inferior class of minstrels. The Ts. were the *trouvères* (*q.v.*) of the S. just as the *trouvères* were the *troubadours* of the N.; the former spoke

the langue d'oc, the latter the langue d'oïl—a distinction more arbitrary than real—but the difference in the idioms of the N. and S. and in the customs of the poets who employed those idioms as also in the style of their compositions is so marked that the two classes have always been treated separately. The Ts. were no doubt the natural heirs of the poets of the Latin decadence, for their poetry had its birth and its development exclusively in the countries forming the southern provs. of Rom. Gaul. The distinctive characteristics of their poetry are tenderness, elegance and flattery; it admirably reflects their wandering life, love of women, and the need to provide for life's necessities. The trouvères, with a more virile style and in a ruder tongue, favoured epics and raised poetry to the level of their character, which is exemplified in their proverbial description as men who held a pen in one hand and a sword in the other. The Ts., softened by a milder life and a more enervating climate, were contented with the composition of songs alone, and these songs were sometimes notable for their wit, though mainly for their naïveté, and they were almost always marred by want of taste, tedium and diffuse subtlety. None the less, the intimate life of the whole *midì* breathes through the lyrical or satirical songs of the Ts. War, religion and women were the three grand sources of their inspiration. The most famous of the Ts. were considered as purveyors of glory and renown, for they sang of the great deeds of the barons, and for this service they were royally welcomed and handsomely rewarded. It was the destruction of the county of Toulouse that dealt the death-blow to the Ts. as an institution, for they could then no longer find patrons or protectors of sufficient power to afford them personal security. Some of the most celebrated Ts. were Bertrand de Born, Geoffroy Rudel; who sought the love of the Queen of Tripoli—whom he knew only from a painting—went out to Tripoli, and so excited her pity on his death-bed that she presented him with a ring; Bernard de Ventadour, son of a serf and remarkable for the precocity of his talents in poetry; Gaucelm Faydit, who having lost all his possessions became a *jongleur*; Arnaut de Marvell, lover of the Countess de Béziers; Bertrand de la Tour; Pierre Vidal; Raymond de Preux; Geoffroy de Luc; Pierre de St. Rémy; Boniface; Ogiers; Arnaut Daniel; Giraud de Bornell; Marchebruse; and Sordello. Often Ts. were of a servile

or low condition, but by no means always, for nobles, princes and even kings either were Ts. or cultivated the arts of the Ts., e.g. Frederick Barbarossa, Richard Cœur de Lion, Alphonse II. and Pierre III. of Aragon, the Marquis de Montferrat and the Comte de Foix. These great persons gave themselves over to Provençal poetry and vied with the other Ts. in the courts of love for the prizes accorded to poetry; and out of this rivalry sprang a veritable camaraderie of talent. Some of the more famous of the songs of the Ts. were *Dame de Bourbon* (or *Flamença*); *Gérard du Roussillon*; *Chronique des Albigeois*; *Roman de Gaufré*; *Fier-à-Bras*; and *Blandin des Cornouailles*.

Troupial, or **Troopial**, (*Icterus*), a genus of birds with yellow and black plumage. The common T. or Brazilian hangnest (*I. vulgaris*) is a handsome bird which is sometimes kept as a pet; it learns to whistle tunes.

Trout, a name applied to various members of the Salmonidæ. The common or brown T. (*Salmo fario*) varies greatly in appearance, not only with individuals but at different seasons. At midsummer an adult T. is usually brownish or olive in colour, with pure white on the belly and gold on the flanks, while the back varies from olive or pale brown to nearly black. The dorsal fin and sides are spotted with black and often also with scarlet. The scales are circular, thin, and minute. When the spawning season begins in autumn all the colour disappears and the body becomes slimy to the touch. The head of the male T. is larger than that of the female, and the lower jaw bears a cartilaginous knob. It feeds on a large variety of food, different kinds appealing in turn. It is by cunning imitations of some prevailing fly that the fisherman makes his most cherished captures. The artificial hatching of T. is now carried on extensively, and lakes and streams can be stocked or replenished with fish. (See **PISCICULTURE**.) The bull T. or sea T. (*S. eriox*) most resembles the salmon in appearance and habits, though thicker in proportion to its length, and with larger and more numerous dark spots on the gill-covers and scales. The salmon T. or white T. (*S. trutta*) is a more elegant fish, and its flesh is much more delicate in flavour. The habits of both are similar. The rainbow T. (*Salmo irideus*) of America has been introduced into many parts of the world; in Britain it has proved disappointing, but it is in New Zealand, especially in Lake Taupo, that it attains

the greatest size, many tons being caught yearly.

Trouvères were the poets of Northern and Central France. They flourished at the courts during the twelfth and thirteenth centuries, eking out with music their unimpassioned and stereotyped songs. See TROUBADOURS.

Trouville, a tn. and port in the dept. of Calvados, France, on the estuary of the Seine. It is a frequented watering-place. Pop. (1926) 6514.

Trover, or Trover and Conversion, in law, the name of an old form of action which lay against anyone who converted or appropriated to his own use any personal property, in which the plaintiff had either a general property as owner, or a special property as bailee. Since the Common Law Procedure Act, 1852, which practically abolished the old common law forms of action, the substance only and not the form of the action has survived.

Trowbridge, a market tn. of Wiltshire, England, famous for its cloths and kerseys. Pop. (1931) 12,010.

Trowbridge, Sir Thomas (c. 1758-1807), an Eng. admiral, was brought up in the naval service under Admiral Hughes in the E. Indies. He took up the blockade of Alexandria, but resigned it to Sir Sidney Smith in 1799. In this year he was made a baronet. In 1805 he was sent to the E. Indies in the *Blenheim* with a convoy of merchant ships. His vessel was last seen near Madagascar, in a violent gale, and exhibiting signs of distress; and the fate of her crew was never discovered.

Troy, Ilium, or The Troad (Τροίη, Τροία, Ἰλιάς γῆ, or Ἰλιον, ἡ Τρωάς), a famous city and dist. of Asia Minor, forming the N.W. of Mysia. The dist., usually known as 'The Troad,' was bounded W. and N.W. by the Aegean and the Hellespont, E. by a ridge of Mt. Ida, S. by the Gulf of Adramyttium, its coast-line extending from Lectum promontory (S.) to the R. Rhodius (N.) below Abydos. In classic legend, the earliest king of this country was Teucer, after whom the Trojans are called Teuciri or Teucirians. His daughter married Dardanus, a neighbouring chieftain, hence Dardanidae (sons of Dardanus) is another name for Trojans. They were probably a Pelasgian race, possibly descended from Thracian emigrants. Dardanus was grandfather of Tros, whose son Ilius founded Ilium or the city of Troy (N.), the largest and strongest settlement in The Troad. The next king of T. was Laomedon, who was succeeded by his son Priam, in whose reign the famous siege of T. by the Gks. took

place, to avenge the rape of Helen, wife of Menelaus of Sparta, by Priam's son Paris. This siege lasted nearly ten years, and ended with the sack and capture of T. by a stratagem of the Gks. (c. 1184 B.C.). The story is told in Homer's *Iliad*, and part in Virgil's *Aeneid*, ii. Once considered purely legendary, it is now commonly regarded as historical in the main outlines, the rape of Helen, perhaps, representing some act of piracy. Among the chief Gk. heroes of the siege were Achilles, Agamemnon, Menelaus, and Odysseus; and among the Trojans, Hector, Paris, and Aeneas. The site of the anct. T. is marked by the Hissarlik mound. The explorations carried on here by Schliemann (1870-90) and Dörpfeld (1893-94) brought to light much valuable information. Remains of some nine different cities were discovered, buried one beneath another, the earliest dating from about 3000 to 2560 B.C. Probably the Mycenaean fortress, sixth in number from the first of all (c. 1500-1200 B.C.), was the Homeric T. There are traces of two Gk. settlements (1000-first century B.C.), and of a new Iliion (first century B.C.-A.D. 500). See *Herod.* v. 95, vii. 75; *Strabo*, xiii.; Leake's *Travels in Asia Minor*, 1824; Lechevalier, *Voyage de la Troade*, 1802; Joly, *Benoît de Ste.-More et le Roman de Troie*, 1870; Lydgate's *Troye-book*, 1513; Dunger, *Die Sage vom trojan Kriege*, 1869; Gorra, *Testi inediti di Storia Trojana*, 1887; Grief, 'Die mittelalterlichen Bearbeitungen der Trojanersage,' 1886, in *Stengel's Ausgaben . . . der romanischen Philologie*; Schliemann, *Ilios*, 1881, and *Troja*, 1884; Hall, *Mycenaean Age*, 1901; Dörpfeld, *Troja und Ilios*, 1902; Ridgeway, *Early Age of Greece*, 1901.

Troy, the co. seat of Rensselaer co., New York, U.S.A., on Hudson R. Shirts, collars, and cuffs are among the chief manufs. There are Bessemer steel-works. Pop. (1930) 72,763.

Troyes, the cap. of the dept. of Aube, France. The settlement once of the Tricassi, in the Middle Ages it became one of the richest cities in Champagne and is noted for its Gothic cathedral. Here in 1420 was signed the treaty granting the Fr. crown to Henry V. of Eng. There are now thriving hosiery manufactories, and a trade in wine. Pop. (1926) 58,321.

Troyon, Constant (1810-65), a Fr. painter, b. at Sévres. He excelled as a painter of cattle, and there are pictures from his brush in the Louvre, the Wallace Gallery, and the Glasgow Municipal Museum. He d. at Paris.

Troy Weight. The term probably

originated from weights used in the tn. of *Troyes* in France. The term 'troy' was first applied to the standard pound in 1495, and was exclusively employed by the dealers in the precious metals, gems, and drugs. The troy pound contains 12 oz.; each ounce 20 pennyweights, and each pennyweight 24 grains. Thus the pound contains 5760 grains, and is to the avoirdupois pound as 144 to 175. For medicines the troy pound is divided into 12 oz.; each ounce into 8 drachms; each drachm into 3 scruples and each scruple into 20 grains.

Trübner, Wilhelm (1851-1917), Ger. landscape and portrait painter; b. Feb. 3, at Heidelberg, where he was pupil of A. Feuerbach. Studied at Karlsruhe and Stuttgart; and later at Munich under Leibl, when he was strongly influenced by the Impressionists. Professor at: Frankfurt-on-the-Main, 1893-1903; Karlsruhe from 1905. Frescoes in Heidelberg town hall, pictures throughout Germany. Died at Karlsruhe, Dec. 21. His wife Sophie, also a painter, committed suicide in Berlin, 1916.

Truce of God, see GOD'S TRUCE.

Truck Acts. The objects of the T. As. are: (1) to ensure the payment in coin of wages in hiring contracts, and (2) to render illegal any provision in a contract for the payment of wages otherwise than in current coin. Historically the T. As. had their origin in fifteenth-century enactments framed to put an end to the practice of defrauding workmen and labourers by paying them in goods of a poor quality or by making unreasonable and excessive deductions from their wages. The Act of 1831 makes it a misdemeanour to make payment by delivery of goods; and by the combined operations of that Act and the Act of 1887 it is illegal for an employer to make any deduction or set-off for goods supplied, either by himself or through any agent of his; and, further, contracts which attempt to specify the place or manner in which wages are to be expended are null and void. The Act of 1896 punishes employers who make contracts with workmen for any deductions from wages by way of fines, unless (1) the terms of the contract are contained in a notice kept constantly posted up in some conspicuous place; and (2) the contract is in writing and signed by the workman, and specifies the acts or omissions in respect of which fines may be imposed, and the amount of such fines. In any event fines can only be imposed for acts or omissions likely to cause damage or loss to the employer, or 'an interruption or hindrance to his business.' There are similar provisions in the Coal and Metalliferous

Mines Regulation Acts. The principal exemptions from the T. As., apart from those impliedly stated above, are: (1) deductions (under written contracts) in respect of materials and tools to miners, fuel, provender for beasts in business, rent, and medical attendance; and (2) deductions for advances by way of contributions to benefit societies or for education of children (including, of course, payments under the National Insurance Acts). Currency notes and bank notes for one pound and ten shillings are equivalent to cash and may be, and of course are, given in payment of wages, notwithstanding the provisions of the T. A., 1831—which, as a general principle, requires payment to be made in current coin of the realm (Currency and Bank Notes Acts 1914 and 1928). Consult *English and Empire Digest*, vol. 24; Halsbury's *Laws of England*, vol. 14; MacDonnell's *Law of Master and Servant*; Smith's *Law of Master and Servant*. See also FACTORY LEGISLATION.

Truffles are underground fungi. The British T. (*Tuber aestivum*) is found just below the surface in beech and oak plantations in the autumn. When mature it is hard and black and warted externally. Inside it is mottled with white and yellowish brown. The T. used in France is *T. melanosporum*, and the garlic-scented T. of Italy is *T. magnatum*.

Trujillo: (1) The birth and burial place of Pizarro and the centre of an agricultural dist. in Extremadura, Spain. Pop. 12,512. (2) A seaport of Honduras, on the Atlantic coast. Pop. 2000. (3) The seat of a bishop and a university tn., with ruins of the anct. Indian city of Gran Chimú in Peru. Pop. (1928 est.) 30,000. (4) A state and its cap. in Venezuela. Area 2856 sq. m. Pop. state (1926) 218,780; tn. 10,500.

Trumbitch, Ante (b. 1863), Dalmatian advocate and deputy to the Austrian Reichsrath, b. at Spalato. Formerly President of the Dalmatian Provincial Diet. One of the sponsors of the Fiume Resolution of 1905 by which the Croats and Serbs of the Dual Monarchy became one political body. On the outbreak of the Great War he fled from Austria and with other leading Yugoslavs formed the Yugoslav Committee, of which he was President. In 1917 he concluded with Serbia the Declaration of Corfu, the preliminary charter of Yugoslav solidarity under the Karageorgevitch Dynasty. In 1918 he concluded with Dr. Torre, acting for a representative Italian Parliamentary Committee, the Italo-Yugoslav agreement which was eventually ratified and approved

by Signor Orlando. When the new Serb-Croat-Slovene or Southern Slav kingdom was formed he became its first Foreign Minister. Was chosen to be one of the Serbian delegates to the Inter-Allied Peace Conference in Paris in 1919.

Trumbull, John (1756-1843), an American painter, hovered all his life between his native country and England, where he studied under Benjamin West. He is pre-eminently the artist-historian of the War of Independence, in which for a time he served as aide-de-camp to Washington. The largest single collection of his pictures is in the possession of Yale College, but 'The Signing of the Declaration of Independence' and three other great pictures now adorn the Capitol at Washington.

Trumbull, Jonathan (1710-85), an American patriot, rose to become governor of his native state of Connecticut (1769-84) after being county judge for seventeen years. During the War of Independence he enjoyed the confidence of Washington, who appealed to him as 'Brother Jonathan.'

Trumper, Victor (1877-1915), Australian cricketer; b. Nov. 2, at Sydney, N.S.W. Played for: Sydney 1st grade, 1894-96; Paddington, 1896-1909; Gordon, 1909-15. In Test Match, Lord's, 1899. Again played in England: 1902, 1905, 1909. Considering brevity of his career, was probably unexcelled as batsman; highest score against England, 185 not out, 1903-04; made 300 not out against Sussex, 1899. Bad conditions seemed not to matter with him. Played in N.Z., 1914. Was attacked by Bright's disease. Died at Chatswood, Sydney, June 28.

Trumpet, a brass wind instrument. It consists of a long, narrow, brass or silver tube, bent twice on itself so that two of the parallel branches form with the third a kind of rectangle with rounded corners. The mouthpiece is cup-shaped and the other extremity broadens out like a convolvulus. Besides the simple T. used in cavalry regiments, there are valve and slide Ts.

Trumpeter, or *Psophia*, a genus of S. American birds allied to the cranes. *P. crepitans* is a bird of lustrous and brilliantly coloured plumage and is often domesticated.

Truro: (1) (The *Treuru* of the Domesday Book.) A city and mun. bor. with a modern cathedral (1880), in Cornwall, England. There are tin-smelting works and potteries. Pop. (1931) 11,074. (2) A tn. and educational centre on Cobequid Bay, in Nova Scotia. Agriculture and dairying are the chief industries of the vicinity. Pop. 7560.

Truss, see **HERNIA**.

Trusts and Trustees. *Legal*.—A trust is an 'equitable obligation binding a person (who is called a trustee) to deal with property over which he has control (which is called the trust property) for the benefit of persons (who are called the beneficiaries) of whom he may himself be one, and any one of whom may enforce the obligation.'—(Underhill on *Trusts and Trustees*.) Legal historians for the most part trace the development of trusts in Eng. law through the doctrine of *uses*. In all probability the Chancery lawyers, who were ever indebted to the principles of civil law, borrowed the whole idea direct from the Rom. *fidei commissum* (q.v.). Equitable estates (see **ESTATE**) are not now ignored or challenged by the common law (see **EQUITY**), but in construing a trust or considering the powers or duties of trustee and beneficiary respectively it is necessary to observe that the trustee usually has the *legal* ownership of the trust property, subject, of course, to his fiduciary obligations; while the beneficiary has only the *equitable* ownership, though such ownership confers upon him the beneficial right to the income or other profits accruing from the property. Any act or default on the part of a trustee which is unauthorised either by the terms of the instrument creating the trust or by law is called a breach of trust, in respect of which the beneficiary is entitled to sue for damages. The Trustee Act, 1925, which consolidates certain of the previous statutes relating to trustees, re-enacts the statutory provision of the Judicial Trustee Act, 1896, whereby the court can exonerate a trustee who has committed a breach of trust but has acted honestly and reasonably (Section 29). Legislation is, however, still faulty in the matter of the trustee's responsibility, for though a distinction is drawn by the courts between the trustee for gain and gratuitous trustee, the latter is still required to show, in case of breach, that his conduct was 'reasonable.' It would seem that a trustee who employs a solicitor who proves dishonest is in a more favourable position than one who has employed an honest agent who gives erroneous advice; for whereas the former is protected by the statute the latter is not. The ideal rule would be that a gratuitous trustee who acts in good faith and on professional advice should be exonerated for any breach that may occur; but so far this is not the legally recognised principle. The appointment of a Public Trustee may be made either by the creator

of the trust, by the person having by the Trustee Acts or by the trust instrument power to appoint new or additional trustees when required, or by the court. The Public Trustee is forbidden by the Public Trustee Act, 1906, to accept the responsibility of certain trusts; *e.g.* trusts exclusively for religious or charitable purposes, trusts for the benefit of creditors, and trusts involving the management of a business. Where there are no trustees available for the purpose of vesting in them land which requires a legal owner under a Settlement, the court may, under the Law of Property Acts, vest the land in the Public Trustee on the statutory trusts, in which case the Public Trustee may not charge fees or act unless requested to do so. Trusts are said to be: (a) *Express*, when created intentionally by the act of the settlor. Express trusts are generally created by deed or will. They are the common means whereby owners of property provide for their issue on their own death or settle property on their children at marriage. (b) *Constructive*, when, though the legal title to property is in one person, the court will decree that he ought in equity to hold the property subject to the beneficial enjoyment of another. (See CONTRACTS, and FRAUDS, STATUTE OF.) All property, real (*q.v.*) or personal, whether situate at home or abroad, and whether in possession or in action (see CHOSE IN ACTION), remainder (see LAND LAWS), reversion (*q.v.*), or expectancy, may be made the subject of a trust, unless the law has made it inalienable (*e.g.* pensions and salaries to public servants), or being land the tenure (see TENURE) is inconsistent with the trusts sought to be created. The expressed object of the trust must be lawful or it will be held void; hence trusts conducive to immorality or fraud, trusts restricting the power of alienation of the beneficiaries' interest, are void (see also RESTRAINT OF MARRIAGE, PERPETUITIES, THELLUSON). Trusts of land must for the most part be evidenced by writing signed by the settlor. Trusts of personal property may be created orally, though it would be highly inadvisable not to use written instruments. Trustees may employ agents, and are not liable for the agents' default (see also *supra*), but they should not allow money or property to remain in the hands of a solicitor or banker longer than is reasonably necessary to enable him to pay or transfer it to the trustees (Act of 1925, Section 23). But under Section 11 of the Act of 1925 the trustee may leave money with a

banker pending investment—a proviso which is not easy to reconcile with that in Section 23. A trustee who is going abroad for more than a month may delegate his trust to an attorney provided the latter is not his sole co-trustee, but he will, notwithstanding, remain liable for the default of the attorney—a principle which seems inconsistent with the changes in responsibility for breaches noticed earlier in this article. Previously to the Act of 1925, the appointor of new trustees could not appoint himself, but he may now do so, so that now the tenant-for-life under a Settlement (*q.v.*) may appoint himself trustee of the Settlement. The Court may appoint new trustees 'whenever it is expedient' and there is difficulty in doing so without its help, *e.g.* where the trustee is a convict, lunatic or bankrupt, or, being a corporation, has been dissolved. The power of advancing capital money to the persons entitled absolutely or contingently on reaching any specified age, or on the concurrence of any other event, may extend to as much as one-half of the capital in the case of personal settlements, but no advancement may be made so as to prejudice any person entitled to a prior life or other interest, whether that interest be vested or contingent, unless such person, being of full age, gives his consent.

Trust Corporation is defined by the Trustee Act of 1925 to mean the Public Trustee or a corporation appointed by the court in any particular case to act as trustee, or a corporation entitled, under rules made pursuant to the Trustee Act, 1906, to act as 'custodian trustee.' Recent Acts have extended the powers and facilities given to such corporations. These corporations are generally banks and insurance companies, but, by the Law of Property Amendment Act, 1926, there are included the Treasury solicitor and official solicitor, and any person holding any other official position presented by the Lord Chancellor, the trustee in bankruptcy, and also certain charitable corporations. Recent legislation has extended the powers of such corporations; *e.g.* they may give valid receipts for the purchase money of land (Trustee Act, 1925, Section 14). Experience shows that banks and insurance companies have been ready to assume these privileges and to accept such trusts either directly or through companies formed by them for the purpose; and indeed it is possible to see in such corporations the natural and appropriate substitute

for the gratuitous trustee. Express provision for the remuneration of the trustee corporations can be made in the instrument appointing them. If the court appoints the corporation it may fix its remuneration.

Trust Companies, see TRUSTS (COMMERCIAL).

Trustee Stocks. A trustee, unless expressly forbidden by the terms of the trust instrument, invests the trust funds in his hands in : (1) The public funds or gov. securities of the United Kingdom, or in any parliamentary stocks; (2) real or heritable securities in Great Britain or Ireland; (3) stock of the banks of England or Ireland; (4) India $3\frac{1}{2}$ and 3 per cent. stock; (5) securities the interest of which is for the time being guaranteed by parliament; (6) consolidated stock of the Metropolitan Board of Works, or of the London County Council; (7) debentures or preference stock of any railway company in Great Britain or Ireland, provided such company has, during each of the ten years last past before the date of investment, paid a dividend of not less than 3 per cent. on its ordinary stock; (8) debenture stock of any railway company in India the interest on which is guaranteed or paid by the Secretary of State for India; (9) 'B' annuities of the Eastern Bengal, E. Indian and Scind, Punjab, and Delhi railways; (10) stock of water supply companies in Great Britain or Ireland; (11) inscribed stock issued by any municipal borough having a pop. of over 50,000, or by any county council. The additional investments allowed under the Trustee Act, 1925, are : a charge by way of legal mortgage; recent denominations of India stock and any other securities the interest whereon in sterling is met out of Indian revenues; Metropolitan Water stock; debentures of Indian railway companies; municipal stocks issued under Act of Parliament or Provisional Order; stocks authorised under the Colonial Stock Act, 1900 (a list of these stocks will be found in the annual issues of *Burdett's Stock Exchange Official Intelligence* and in the *Yearly Practice of the Supreme Court*); housing bonds; and Northern Ireland Gov. stock. Though Bank of Ireland stock is retained in this consolidating Act, stocks of the Irish Free State are excluded. Trustees, unless expressly prohibited from so doing, may invest in bearer securities which if they were not payable to bearer would have been authorised securities.

Trusts (Commercial). T. is the term somewhat loosely applied in the business world to a large financial and industrial combination. The

aim of Ts. is partly monopolistic. In essence they are really the union of separate corporations or companies trading in the same or similar commodities. The shareholders of the separate companies taking part in the union surrender their holdings to a board of trustees and in return for such surrender receive a T. certificate setting forth the value of their holding in the T. The trustees now virtually become a board of directors controlling and directing the different members of the T. as one single whole. It will be at once patent that by arrangements of this nature much in the way of expensive competition is eliminated, overhead charges are reduced to a minimum, expenses of production and distribution are curtailed. If there were no other factors operating, the public would stand to gain in the long run from the workings of these combinations. But too often, when competition has been successfully eliminated, the T. is more concerned in increasing profits than in passing on to the public the benefits which have accrued after a successful period of trading. Of course there is a limit to which prices may be raised through Ts., as rival concerns would not be long in establishing themselves. The first of these modern Ts. was that established in the U.S.A. by John D. Rockefeller (*q.v.*), who in 1882 formed the Standard Oil Trust with a capital of \$100,000,000. This T., at its inception, was able to control 85 per cent. of the total output of refined petroleum in the U.S.A. It has been realised in the U.S.A. for many years that Ts. are a potential danger to the community. Laws have been passed by Congress and different states in the Union declaring them illegal and forbidding their promotion. But the T. has come to stay in some shape or form and is characteristic of modern business and finance. See also CARTEL; COMBINE; CAPITAL AND CAPITALISM.—*History of Capitalism*; MONOPOLIES; TAFT, WILLIAM HOWARD.

'Truth,' an Eng. sixpenny weekly paper founded in 1877 by Henry Labouchere. Notable for its fearless and effective exposure of frauds. Devotes special attention to naval, military and air force topics.

Truth, in philosophy, is defined by Maritain as a word which expresses, as it really is, the speaker's thought, and a true thought represents, as it really is, the thing to which it refers. T. in the mind therefore conforms with the thing. The degree of T. depends upon our organs of knowledge. The search for T. and especially criticism of T. form a

branch of philosophy called epistemology (*q.v.*). Nietzsche regarded T. as a form of fetter which the world must, to know itself, break asunder, while at the opposite pole is the school of philosophers—the sceptics—who challenge the possibility of T. in itself. Famous sceptics include the ancients, Gks., Pyrrho, Arcesilas, and Carneades, and Montaigne and Sanchez of the sixteenth century, with David Hume in the eighteenth century. Later philosophers who challenged intellect's reason as capable of finding T. include Rousseau, Fichte, Schopenhauer, Bergson, William James. They claim that T. is to be found rather in the will, in feeling or in action. Rationalists hold that T. is easy to attain, and undertake to bring all things within the comprehension of reason which is competent to attain T. independent of reality, or of God, claiming to achieve perfect wisdom by natural powers, thus rejecting possibilities of Divine influence. Descartes, Malebranche, Spinoza, and Leibniz are among them. The school of Aristotle and St. Thomas teach that T. is neither impossible nor easy to attain. It is thus opposed both to sceptics and rationalists. Kant, the founder of subjective philosophy and his successors Schelling and Hegel, deified the human subject of knowledge, and rationalism and scepticism appear to find common ground in their anti-intellectualism. Such philosophy is termed modernist. See Maritain, *Introduction to Philosophy* (trans. 1930), also the works of the philosophers mentioned above.

Trygon, *see* STING-RAYS.

Tryon, Dwight William (1849-1925), an American artist, *b.* at Hartford, Connecticut. Studied art at Paris. His principal landscapes are of New England. He exhibited at the Salon, Paris, 1881, and returned in the same year to New York, where he settled down. In 1886 he became professor of art at Smith College. His best pictures are considered to be 'Daybreak' and 'Early Spring, New England.' He was a member of the Society of American Artists. Died at S. Dartmouth, July 1.

Tryon, Sir George (1832-93), an Eng. admiral, was in command of the first British ironclad, the *Warrior* (1861-64). Director of transports during the Abyssinian expedition of 1867, he was afterwards commander-in-chief on the Australian station (1884-87). At the time of his death, due to a fatal collision between the ill-starred *Victoria* (*q.v.*) and the *Camperdown* off Tripoli, he was in command of the Mediterranean fleet.

Trypanosomes, Trypanosomiasis, *see* SLEEPING SICKNESS.

Tsad, *see* CHAD, TCHAD, OR TSAD, LAKE.

Tsaldam (more correctly Tsädum), a Central Asian region, lying between N.E. Tibet and W. of the Koko-nor, formerly the bed of a vast salt lake.

Tsar, or Czar, title of the Russian emperors; the wife being called 'Tsaritsa.' It has a common origin with the Ger. 'Kaiser' in the Latin *Cæsar*.

Tsaritsyn, *see* STALINGRAD.

Tsarskoe Selo, a tn. in the Leningrad Area of the Russian S.F.S.R., now named Detskoe Selo. It is 15 m. S. of Leningrad and is a summer resort containing two former imperial palaces. Pop. 31,000.

Tschaikowsky, Nikolai Vasilyevich (1850-1926), Russian Liberal, *b.* at Viatka—a relative of the composer T. In 1869, when a chemistry student at St. Petersburg, he founded a circle for the enlightenment of peasants and artisans, of which Prince Peter Kropotkin was a member. The gov. broke it up. T. left Russia, 1873; lived two years in Kansas, U.S.A., trying to found a Christian community. Settled in England, became a prominent member of the Society of the Friends of Russian Freedom. Secretly returned to Russia, 1905; arrested, 1909; tried for acts of terrorism and acquitted, 1910. Returned to England, and, after second Russian revolution of 1917, was on the 'White' front in N. Russia, opposing Bolshevism. Prime Minister of Archangel during British occupation. Member of Russian Political Committee during Peace Conference, Paris; where he was consulted by Allied Govs., and where he latterly lived. Returned to England, Dec. 1925. Died at Harrow, April 30.

Tschaikowsky (or Tchaikovsky), Peter Ilyich (1840-93), a composer; settled in St. Petersburg in 1850, where he joined Anton Rubinstein's new Conservatoire in 1862. From 1866 to 1877 he was professor of harmony at Nicholas Rubinstein's Conservatoire at Moscow. An unhappy marriage then disturbed his life for a time, but in 1879 he was freed from the necessity of teaching, and withdrew to the country and devoted himself to composition. As a composer T. shows remarkable versatility: he attempted operas, *e.g.* *Foyevode* (1869), *Eugen Onegin* (1879), *Maid of Orleans* (1881), symphonies, chamber, vocal, and instrumental music, and in every branch he accomplished masterpieces, *e.g.* his 4th, 5th, and 6th symphonies, his string quartets, his piano concerto in B flat minor and violin concerto in D minor, and his splendid orchestral pieces, *Francesca de Rimini* and *Romeo and*

Juliet. His genius was essentially national, and his music expresses all the mingled fire and melancholy of the Slavonic temperament. See Life by E. Evans (Master Musician Series).



P. I. TSCHAIKOWSKY

Tschudi, Ægidius, or Schudy, Gilles (1505-72), a Swiss chronicler, became 'landammann' or chief magistrate of his native state. His *Chronicon helveticum*, 1001-1470, in spite of its unreliable character, remains a groundwork of Swiss history.

Tseng Kwo-Fan (1811-72), a Chinese soldier, was largely instrumental in crushing the Taiping rebellion. Between 1851 and 1862 he was busily engaged in clearing the provs. of Hunan, Kiangsu, Cheh-kiang, and Ngan-hui of the rebels. Finally in 1864 he captured their stronghold, Nanking. His services were requited with the highest offices of state.

Tsetse Fly, or *Glossina morsitans*, a fly belonging to the same family (Muscidæ) as the common house flies, and a cause of enormous loss among domesticated animals in Uganda and other parts of Africa. It is a blood-sucker, and though its bite is not itself dangerous, it is the means by which a parasitic protozoon is introduced into the blood, causing nagana or fly-disease. The fly breeds in low-lying damp localities. It is similar in appearance to the house fly, and has a very long and slender proboscis. The wings are more leaden and more opaque, and the thorax is chestnut with four black longitudinal stripes. The abdomen is yellowish-

white with a black spot on four of the five segments. Another species of the genus conveys sleeping sickness.

Tseziz, see WENDE.

Tsimshians, or Chimmesians, a tribe of N. American Indians, now almost extinct, who dwell along the shores of the Pacific, facing the Queen Charlotte Islands.

Tsinan-fu, the cap. of the prov. of Shantung, China. The chief manuf. is silk, and it also trades in precious stones. Pop. 300,000.

Tsingtao, on Kiao-Chow (Chiao-Chow) Bay, Shantung, China. T. was leased to Germany in 1898 for ninety-nine years and a harbour and fortress were developed there by the Ger. Gov. When the Great War broke out, the harbour served as a base for Ger. raiding warships. It was blockaded by Japanese navy and a British-Japanese military force attacked it from the N. By the end of October 1914 the investment had begun and the fortress capitulated on Nov. 7, 1914. Restored by Japan to China Dec. 1922. Kiao-Chow Bay is a well-protected natural harbour, 19 m. long by 15 m. wide; but for accommodation of deep-draught vessels and for berthing, breakers and dredging are necessary. The harbour is now in charge of the Ministry of Communications. The Japanese salt fields and fisheries at T. were taken over by the Salt Administration under the Sino-Japanese Agreement of 1922 and China paid Japan 2 million yen. Pop. (including neighbouring dist.) 318,000.

Tsushima, an is. of Japan, situated S. of Korea. It is mountainous, and really consists of two is.; the uniting neck being dry only at low tide. In the strait of this name (in 1905) the Russian fleet was annihilated by the Japanese under Togo. Area 262 sq. m. Pop. 39,000.

Tuam, a tn. in co. Galway, Irish Free State. It is the seat of an Anglican bishop and a Rom. Catholic archbishop. Pop. 3200.

Tuaregs, see BERBERS.

Tubas, in music, tenor and brass wind instruments, valved, and of lusty tone.

Tubercle and Tuberculosis. The tubercles which characterise the diseases classed under tuberculosis are the result of the attack of the tubercle bacillus and the defensive operations against it. The bacillus is a non-mobile organism, rod-like, with rounded ends. Koch, 1882, announced his success in isolating it and cultivated it on coagulated blood-serum. The Ziehl-Neelsen method of staining with acid fuchsin and methylene blue is practically specific and is convenient, giving red bacilli

on a blue background. Leprosy bacilli stain in the same way but are more readily decolorised by sulphuric acid. Much's method of staining is under certain conditions superior to the Ziehl-Neelsen method in that it reveals the presence of more tubercle bacilli in the tissues. In this method, acid methyl violet is followed by Gram's iodine, the preparation being subsequently treated with nitric acid, hydrochloric acid, and finally with a mixture of acetone and alcohol until all structures other than the tubercle bacilli are decolorised. The bacillus of the mammalian disease lives between temperatures of 29° C. and 42° C., flourishing best at 37-38° C. It is destroyed, generally, after 4 to 6 hours at 55° C.; 15 minutes at 65° C.; 5 minutes at 80° C.; 2 minutes at 90° C.; and in less at boiling point. Its resistance to desiccation is very marked; if not exposed to sunshine it retains its virulence for as long as six months; exposure in direct sunlight kills it in a few hours. Metchnikoff studied the effect of the attack in the human body, determining the ingestion of the bacillus by leucocytes and the cells of connective tissue and of the lining of the alveoli. These phagocytes throw off antitoxins, or absorb the bacilli, after they have been acted on by opsonins (Sir A. Wright). If the attack succeeds, leucocytes are destroyed and form pus. *Grey tubercle* is the first and most characteristic lesion; it varies in size from a pin point to a small pea, and is slightly translucent, consisting of small and large cells containing bacilli. These tubercles gradually change to opaque, slightly granular, dry and friable *yellow tubercles*, which coalesce, increasing in size. Blood-vessels are found in neither variety, but the lesions produce inflammation in surrounding vascular tissue, often producing suppuration and abscess. The change from grey to yellow is due to caseation, originating in the centre of the grey tubercle and spreading till the whole has the appearance and consistence of cheese; the caseous mass may then calcify and the disease be stopped; in small tubercles the change may be to a mass of fibrous tissue. The deposition of lime salts encloses the bacilli and kills them. In the case of suppuration and abscess, discharge leaves cavities with weakened walls open to further attack and disease spreads. The leucocytes themselves may migrate and spread infection.

Tuberculosis is infectious and infection has been generally attributed to other human patients, or to animals used for food, especially cattle and pigs. The chief means are

inhalation of dried expectoration particles, or of wet particles, as in kissing or during coughing, or the ingestion of tuberculous milk or other foods. The question of identity of tuberculosis of the bovine and avian type with that of man is not yet definitely settled. Koch is against identity, and Von Behring considers bovine bacilli more virulent in man. The Royal Commission interim report of 1904, and that of the Tuberculosis Congress in Paris, 1905, lean to Von Behring's view; the final report of the former, 1911, considers identity as true for bovine and porcine, but not for avian tuberculosis. It is now generally established that the bovine and human forms of bacilli are different and that whereas the bovine form does not cause phthisis in human beings, it may cause intestinal and other forms of human tuberculosis. The general tenet is that infection from milk is prevalent among children, and otherwise infection is due to overcrowding, particularly of bedrooms, and neglect of isolation. Attention to these and the innumerable improvements due to greater prosperity in England have led to a fairly steady decrease in phthisis, in males of 8.8 per cent. on the average in quinquennial periods since 1876; for the years 1909-11 the saving in life in tuberculosis, on a calculation from similar figures, amounted to over 170,000, or between 4 and 5 per cent. of the saving on all diseases. The number of deaths from T. in England and Wales averages 30,000 a year; the rate per million of the population in the five years 1924-28 was 841, 833, 771, 791 and 755 respectively. The ratio of deaths from tuberculosis to those from all other chief acute infectious diseases is about 60 : 67; the disease also appears to act chiefly between the ages of twenty-five and forty-five. Among the causes of susceptibility to infection, physical over-exertion stands high; malnutrition and alcoholism also play a large part. Influenza, whooping cough, measles, and to a less extent scarlet and enteric fevers predispose to success of attack. Hereditary transmission is, of course, unproved, though intra-uterine infection is known; hereditary predisposition is probable. The disease being so widespread, so distributed in age and sex, its latent period so indeterminate, statistics are extremely difficult to collect correctly, and much of the subject is still *sub judice*. No connection with climate can be said to be established, nor yet with soil; a retentive soil, without drainage, is probably unfavourable as for many other diseases. General tuberculosis

is the form distributed over many parts of the body; when confined to the lungs, phthisis, consumption, and pulmonary tuberculosis are the terms used. *Tabes mesenterica* or tuberculous peritonitis is applied to the affection of the peritoneum or abdominal lymphatic glands; tuberculosis of the membranes of the brain is known as tuberculous meningitis or acute hydrocephalus. Lupus, infection taking place probably through skin wounds, is tuberculosis of the skin; caries, that of the bone; scrofula, that of the lymphatic glands. In miners' and knife-grinders' phthisis, tuberculosis is possibly only a superadded cause of death. Koch in 1890 announced his tuberculin treatment by infection, but it has not met with much success, and is undoubtedly difficult to prescribe in individual cases; it has often been found to aggravate the disease. Acquired immunity against tuberculosis may be gained by inoculation with living attenuated tubercle bacilli. Calmette attenuated bovine tubercle bacilli by culturing them for years in a medium containing bile. Spahlinger's (*q.v.*) treatment by injection with 'antigens' was given a favourable reception by the medical profession in 1932. The administration of such a vaccine may, like the tuberculin treatment, be extremely dangerous and should be carried out only by an experienced worker. Such immunity lasts only for a year or two. Treatment consists in isolating the case, good nutritive diet, freedom from worry or anxiety, an open-air life with as much sunshine as possible. The Finsen light has proved very successful in lupus. In tuberculosis of the bone amputation is generally resorted to, though scraping is sometimes successful. It is rather in the direction of prevention that the disease is being overcome. More cleanly habits, especially the abolition of expectoration; sanitary dwellings, not crowded nor with insufficient air space indoors, particularly less crowding of bed- and sick-rooms; isolation, and better social conditions in general, are producing most effect. The extermination of tuberculous food animals and prevention of sale of such contaminated food are considered necessary and desirable. Practically no herd of cattle in the British Isles is free from tuberculosis. All these points call for individual sense of responsibility rather than state action, but the scourge has reached such dimensions as to need the latter. In 1913 a departmental order made all cases of tuberculosis, public or private, notifiable by medical practitioners. Sanatoria were also estab-

lished in connection with the Insurance Act. In 1905 an International Congress was held in Paris. In Great Britain the Public Health regulations of 1930 require, within two days, notification to the local medical officer of health, and empower local authorities to isolate advanced cases. See BACTERIA and VACCINE-THERAPY. Consult L. S. T. Bursell, *Recent Advances in Pulmonary Tuberculosis*; F. E. Gunter, *Tuberculin in Practice*; W. C. Minchin, *A Study in Tubercle Virus*; J. A. Myers, *Tuberculosis among Children*; W. G. Savage, *Prevention of Human Tuberculosis of Bovine Origin*; W. B. Tomson, *Some Methods for Prevention of Tuberculosis*; W. G. Wilkinson, *The Principles of Immunity in Tuberculosis*.

Tubes. Steel T. may be classified under three heads, being made (1) by riveting together rolled plates of steel (this method is applicable chiefly to the larger sizes); (2) by rolling a weldless T. out of solid billet; (3) by welding together the edges of a rolled strip of metal. The first process is fairly obvious, and so we will proceed to examine the weldless process. First, the billet is pierced through by a hole some one inch in diameter, in the cold state; it is then heated, and the hole is squeezed out in a hydraulic press to some three inches in diameter. The billet is then taken to a mill similar to that used for rolling round bars, except that each pass is provided with a mandrel, which the T. is either rolled on to or else rolled off from. The latter is used if the T. is of so small a diameter that the mandrel would not be stiff enough to resist the thrust. If the finished T. is larger than can be dealt with on one mandrel, or else too thin to be rolled hot—8 ft. being the extreme length and $\frac{1}{4}$ in. the minimum diameter—cold drawing is resorted to, this process at the same time imparting stiffness to the T. The cycle consists of annealing, pickling, boshing, drying, oiling, and cold drawing. This process squeezes the T. tightly on to the mandrel, and it is only possible to remove it by means of a reeling machine, in which the T. passes between two conical rollers, which are set slightly askew. This squeezes the walls of the T. away from the mandrel, which can be easily withdrawn when the whole length has passed through the reeling machine. Cylinders used for compressed gases or air, as are used in magic lanterns and in torpedoes or in 'sparklets,' are weldlessly made by deep stamping sheets, the thickness being about $\frac{1}{4}$ in. The material for weldless Ts. is usually a very mild basic steel, having only a

trace of Si, Mn about 0.35, S and P as low as 0.02 to 0.03, and C 0.08 to 0.07 per cent. The addition of 20.25 per cent. nickel adds largely to the life of Ts, which are subjected to the conditions of high-pressure water-T. boilers. *Lap-welded* Ts. are manufactured from strips of steel whose rolled width is slightly more than the circumference of the finished T. At a dull red heat this strip is drawn through a die, the sides of which are gradually twisted round and upwards, so that the sheet gradually assumes the shape of a rough T., with the bevelled edges lying close together. This done, the T. is put in the furnace and brought to welding heat, when it is run through a pair of grooved rolls on to a mandrel, as in the manuf. of weldless Ts. By this means the T. is completely welded up, but for the best work the operation is repeated. The finished T. is then taken to the reeling machine for straightening and removal of the mandrel. *Butt-welded* Ts. are made in a similar way. But the dies through which the strip is drawn leave the edges of the strip a little way apart and at 90° to each other. The welding takes place in two operations: first, the inner edges are welded at one heat; and lastly, the outer edges at the second, after which the T. will be found to be completely welded throughout the thickness of the material. *Spirally-welded* Ts. are used for sporting guns, so as to avoid the weakness of a continuous straight seam. The strips are originally wound spirally and are welded edge to edge. The original Armstrong guns were made on this principle. *Seamless copper* Ts. are made by depositing Cu from an acid solution electrolytically on to a mandrel. Subsequent treatment confers the necessary strength, etc. For further information, including the Mannesman process, see Harbord and Hall, *Steel, Metallurgy of*.

Tubes, Pneumatic. The system of pneumatic dispatch is one by means of which letters and parcels can be transmitted through tubes of small diameter at a great velocity by air pressure. America has installed many systems for the dispatch of letters and parcels, and the tubes are generally 8 in. in diameter. Boston Post Office has a very extensive installation. The necessary features of the system are: (1) a 'tube' of suitable material; (2) a 'carrier' or receptacle for letters or parcels, made either of steel or gutta-percha; it is in shape similar to a small cylinder; attached to the ends are 'pads' which exactly fit the internal diameter of the tube,

thus preventing any escape of air; (3) a 'transmitter'; and (4) a 'receiver' at each station and point of entry along the tube. The power is supplied by electric motors which create a current of air at a low pressure. There are two tubes on the system, one for each direction of delivery. When the carrier is dispatched to a certain point, the tube at the receiving end is 'closed' and the carrier is brought to rest by the action of the air cushion formed in the closed section of the tube. The carrier is then discharged by opening the gate of the closed section of the tube, when the pressure is equal to that of the atmosphere. An attachment of metallic discs is fastened to the front of the carrier. At the point of discharge a machine is placed, having two metallic pencils attached to the front. These are tuned to attract only the carriers for that station, passing all the other carriers. This is obtained by fastening a disc to the carrier of the same size as the distance between the metallic pencils at the station to which the carrier is to be dispatched, and the carrier is then automatically discharged. This system is known as the Batcheller pneumatic tube system. The despatching apparatus of the Siemens P. T. system, which is a circuit system, as opposed to the Lorex dispatch system, as used in the British Post Office, is similar to that of the Batcheller system. In the Siemens system, in order to neutralise the intermittent action of the pumps and ensure a uniform flow of air, 'containers' are provided; these are arranged to have sufficient capacity to give out a reserve supply when the load on the tubes becomes abnormal as occasionally happens. The circuit system of P. T. or, in other words, the system disposing stations in a circle round which the carriers are drawn one way only, has been for some time in use in Paris, and other great continental cities, as well as in America.

Tübingen, a tn. of Württemberg, Germany, on the outskirts of the Black Forest. The chief buildings of interest are the tn. hall, the Stiftskirche, the Rom. Catholic cathedral, and the castle of Hohentübingen on a height overlooking the tn. It was here that the Tübingen school of theology had its origin. There is a noted university, founded in 1477. The tn. is a manufacturing centre, notably for chemicals. Pop. (1925) 20,276.

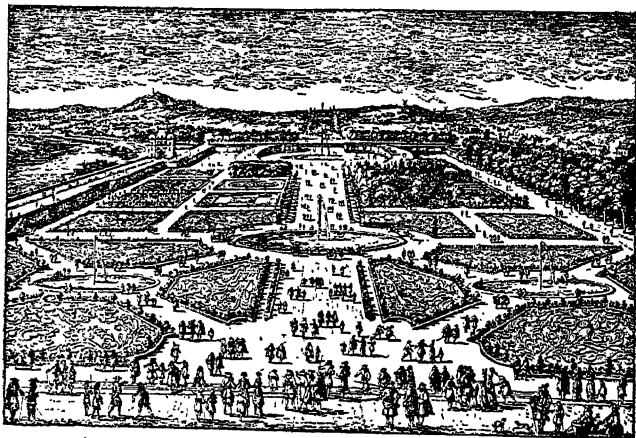
Tubuai, or Austral, an archipelago in the Pacific Ocean, situated S. of the Society Islands. The chief products are oranges, cotton, sugar, bananas, and tobacco. Pop. 2500.

Tucson, the co. seat of Pima co., Arizona, U.S.A., and the largest city of the dist. T. has grown with enormous rapidity during the last twenty years. It is an important trading centre, particularly for local farming products. The climate is dry, and irrigation farming is carried on. Cotton, alfalfa, and grain are produced. Here are situated the University of Arizona founded in 1885, which grew from having 200 pupils in 1909 to having over 2000 in 1930; the State School for the Deaf and Blind, the State Agricultural School, and St. Joseph's Academy. In 1900, T. was made the see of a Rom. Catholic

of Edmund, Earl of Richmond, who married Margaret, great-granddaughter of John of Gaunt, and their son claimed the throne and as Henry VII. reigned from 1485 to 1509. The other T. monarchs were: Henry VIII. (1509-47), Edward VI. (1547-53), Mary (1553-58), Elizabeth (1558-1603).

Tudor Style, in architecture, a somewhat indefinite term, covering the Eng. architecture of the reigns of Henry VII., Henry VIII., Edward VI., Mary, and Elizabeth. Though not a variety of Gothic, it shows Gothic influence in many ways. Its chief product was the Tudor manor.

Tuff, a term which includes the



BIRD'S-EYE VIEW OF THE TUILERIES GARDENS : THE PARTERRE
(From an old engraving)

bishop. Mining is an important industry and T. has an experimental station of the U.S. Bureau of Mines. T., owing to its dry climate, is a favourite resort for winter visitors. Pop. (1930) 32,500.

Tucuman: (1) A prov. of Argentina. The western part is mountainous and covered with forest. There are mines of gold, silver, and copper. The chief products are cereals, fruit, tobacco, and sugar. Area 10,423 sq. m. Pop. (1928 est.) 417,879. (2) Cap. of the above prov., has a cathedral and a university and is engaged in sugar refining and distilling. Pop. (1927) 91,216.

Tudor, the surname of an Eng. dynasty, founded by a Welshman, Owen T., who married Catherine, widow of Henry V. He was the father

finer kinds of volcanic detritus. Beds containing large blocks of ash are called agglomerates.

Tugela, riv. of Natal, S. Africa, has its source in the Drakensberg Mts., flowing in a S.E. direction, past Ladysmith and Colenso, to empty its waters into the Indian Ocean. At Isandhlwana and Rorke's Drift on the T., actions were fought in the Zulu War (1879). At the former the British were defeated with the loss of 800 European and 500 native troops. At Rorke's Drift the Zulus were repulsed with heavy losses.

Tuileries, Palace and Garden of the, situated in the centre of Paris. Here, in 1342, a certain Pierre des Essarts possessed a pleasure house, called the Hôtel des Tuileries, because it was built in a locality outside the city

where there were several tile-works (Tuilleries). This site was chosen by Catherine de' Medici for a new palace, and the building was begun in 1566, the architect being Philibert Delorme (q.v.). The palace was burned down by revolutionaries in 1871.

Tuke, William (1732-1822), an Eng. philanthropist and Quaker, of York. Pioneer in the humane and scientific treatment of the insane. He induced the Society of Friends to take this matter up, and in 1796 the York Retreat was opened.

Tula: (1) A prov. of the Russian S.F.S.R., in the Moscow Industrial Area, S. of Moscow. It is watered mainly by the Volga and the Don, and is well cultivated. Coal and iron are found. T. and Bjelev on the Oka are the chief tns. (2) Cap. of above, at the confluence of the Tulitza and Upa. Arms and cutlery are the chief manufactures. Russia leather, candles, soap, tallow, sealing-wax, paints, and woollens are also produced, and there is trade in hemp and corn. Pop. (1926) 152,677.

Tulip (*Tulipa*), a genus of plants (order Liliaceæ) of which one species (*T. silvestris*) occurs rarely in chalk pits in Britain. It has bright yellow fragrant flowers. Most of the florists' varieties are derived from *T. gesneriana*. The T. has an exceptionally wide range of colours. The bulbs are planted in October and November. Millions of bulbs are exported annually from Holland, and the Channel Islands also have a large export trade in Ts.

Tulip Tree, or *Liriodendron tulipifera*, a tall American tree (order Magnoliaceæ) bearing large fragrant flowers which superficially resemble those of the tulip.

Tull, Jethro (1674-1741), an Eng. agricultural writer. He began experiments on his father's land in Berkshire and invented a machine-drill. He insisted on the importance of 'pulverising' the soil and the proper use of manure. His chief work is *Horse-Hoeing Husbandry*, which met with opposition and abuse.

Tullamore, a tn. of Offaly (King's co.), Irish Free State. Pop. 4600.

Tulle, the cap. of the dept. of Corrèze, France. It manufs. firearms for the gov. Pop. (1926) 14,349.

Tullius, see CICERO, MARCUS TULLIUS, and CICERO, QUINTUS TULLIUS.

Tullius, Servius, sixth king of anct. Rome, 578-534 B.C., who surrounded Rome with a wall, enclosing the Seven Hills. He made an alliance with the cities of the Latin League and established the *comitia centuriata*, or classification of the citizens according to wealth, giving the plebeians political rights.

Tulloch, John (1823-86), an eminent Scottish divine, b. in Perthshire. He was at first minister of St. Paul's, Dundee, then moved to Kettins, Forfarshire, and in 1854 became Principal of St. Andrews. He finally became moderator of the General Assembly, 1878. He contributed to the leading magazines, being editor of *Fraser's* for a time. Both his politics and religion were fearlessly Liberal. His chief works are: *Leaders of the Reformation*, *Rational Theology and Christian Philosophy in England in Seventeenth Century*, *Modern Theories in Philosophy and Religion*, *Movements of Religious Thought in Britain in Nineteenth Century*. See Mrs. Oliphant, *Memoir*, 1888.

Tulsa, a banking post-tn., Oklahoma, and co. seat of Tulsa co., U.S.A., on the Arkansas R. Pop. (1930) 141,258.

Tulsi Das (1532-1623), a Brahman poet and religious reformer. His masterpiece is *Ramayana* (almost the Bible of the Hindus). He taught the universal fatherhood of God and love to all creatures. See Growse's trans. of his poem.

Tumbrel, or **Tumbril**, the ducking-stool used to punish scolding women in olden times. It consisted of a stool or chair at the end of a long pole, which could be swung over a pond and lowered. It was also used to punish transgressing bakers and brewers. The same name is applied to the covered carts for tools, etc., in a train of artillery; also to the execution carts used in the Fr. Revolution.

Tumour, a swelling, more particularly a new growth that is not the result of inflammation. The term was originally applied to any enlarged condition of a structure, but scientifically, a T. is a mass of cells, resembling those normally present, but differently arranged, and proliferating at the expense of the organism without serving any useful purpose. For such Ts., to avoid confusion, the terms *teratoma* and *blastoma* have been introduced. The former is a T. arising from undifferentiated cells; the latter arises from differentiated cells capable of forming only one kind of tissue. The cells of typical Ts. resemble those of the parent mass of cells; those of atypical Ts. may be so modified that it is difficult to trace their origin. The cause of such proliferation is not yet known; little can be said beyond the hypothesis that the normal processes of cell growth are disturbed by local conditions not occasioned by bacterial invasion or any extrinsic influences. Ts. are broadly classified into *non-malignant*, *innocent*, or *benign*, and *malignant* or *cancerous*.

The essential characteristics of non-malignant Ts. are that they grow and divide without destroying or invading the surrounding cells which are simply pushed aside as the mass of the T. grows. A thin layer of fibrous tissue forms a definite boundary to the extent of the T., and if the growth be excised completely no recurrence can take place. Malignant Ts., on the other hand, tend to invade the surrounding tissues. There is no definite boundary, and the cells infiltrate into neighbouring tissues and replace the normal cells. Cancer (*q.v.*) cells may also be disseminated by means of the lymph channels to other parts of the body, giving rise to secondary or metastatic Ts. When the original T. has been excised, there is every probability of the growth recurring, and it is difficult to say at any time how far its influence has extended. Powell White classified Ts. as organomata, histiomata, and cytomata, according to whether they consist of organs, tissues, or cells. These groups are subdivided into connective-tissue Ts. and epithelial Ts., and still further as fibromata, myomata, osteomata, chondromata, etc., according to the nature of the structures involved. Adams has introduced a classification based on the embryological development of the cells. Consult T. Boveri, *Origin of Malignant Tumours*; E. H. Kettle, *The Pathology of Tumours*; G. Warburg, *The Metabolism of Tumours*.

Tumult, see **Riot**.

Tumulus, or **Barrow** (Lat. 'a little hill'). Tumuli, or artificial mounds of earth, of various sizes and forms, are commonly supposed to be tombs or sepulchral memorials of persons of distinction, or of warriors slain in battle. The first careful investigations into the tumuli of Eng. were made by Dr. Stukeley in the neighbourhood of Stonehenge. The remains found in the Wiltshire barrows belong variously to the Stone, Bronze, and Iron Ages.

Tunbridge, see **TONBRIDGE**.

Tunbridge Wells, Royal, a mun. bor. and watering-place of Kent, England. Its chalybeate springs were known in the time of James I. and were much frequented in the eighteenth century. The Pantiles is a fashionable parade. T. W. ware (wood-mosaic) is manufactured. Pop. (1931) 35,370.

Tundra, a term applied to a geographical region in N. Russia and Siberia, but now generic for all such regions, e.g. the barren lands of Canada. Primarily, it is a region which by reason of high latitude and consequent inclement climate is almost destitute of trees. The soils are completely frozen, except for a depth of a foot or two during summer, at

which season the surface water forms pools, lakes, and marshes, the formation of which has been largely determined in the larger features by the ice cap extending over it during the glacial age. The vegetation is stunted and scanty, consisting of mosses, lichens, dwarf birch, and willow, and an 'Alpine' flora. Except for the reindeer or caribou and musk-ox, the fauna consists of small furred animals, whose skins are sought by hunters and trappers. In the N. the T. passes into arctic glaciated conditions; its southern boundary merges gradually into coniferous forest.

Tungsten, symbol W, atomic number 74, atomic weight 184, a metallic element which occurs in nature as wolfram (iron tungstate), Scheelinite (lead tungstate), and wolfram ochre (T. trioxide). The metal can be obtained by reducing the trioxide on charcoal with hydrogen. It is a hard grey metal (melting point about 3300° C., sp. gr. 18.7). It forms three oxides: WO₃, basic and a reducing agent; W₂O₅, blue in colour; and yellow, WO₂, which gives rise to the tungstates when treated with alkalis. Tungstic acid, H₂WO₄, is made by the action of acids on tungstates. The chlorides of the element are decomposed by water. T. is used largely for electric lamp filaments. These filaments may be made (a) by drawing tungsten rods at 2000° C.; (b) by compression of a mixture of T. powder and an organic compound, carbonising, heating, and then shaping into the required form; (c) by heating a carbon filament in the vapour of T. oxychloride and hydrogen, when T. deposits on the carbon centre.

Alloys.—T. alloys well with aluminium and with chromium. Well-known steels containing T. are characterised by being very strong and hard, and not losing the 'temper' when heated. They are especially valuable for high-speed cutting tools. Such steels contain W 16–20 per cent., Cr 3–5 per cent., and iron.

Tunguses, the name given to a branch of the Mongolian, or Mongolo-Tartar, race, which dwells in the mountainous dists. of Eastern Siberia and the region drained by the R. Amur. The Tunguses lead a nomad existence, though some have taken up agriculture. Most of them are engaged in forest hunting. In common with most of the Siberian aboriginal races, they are diminishing in numbers. They profess the religion of Buddha, as do most of the Mongolian Siberians.

Tunic, the Latin name of the principal undergarment of men and women, corresponding to the Gk. chiton. Women wore the 'palla' over it, and men the 'toga.' It was

of woollen material with short sleeves (if any), and reached to the knees in a man, to the feet in a woman. It was usually worn with a girdle, and was adorned with a narrow or broad purple stripe for a knight or senator respectively. The name is also applied to an ecclesiastical vestment, or to any short loose garment reaching from the neck to above the knee.



[D. McLeish

TUNIS

The Mosque of El Ksar (eleventh century)

Tunicata, a class of marine animals. The majority in their adult stage live a stationary life, fixed to rocks or to the sea-bottom, occurring chiefly in the form of cartilaginous or leathery sacs. Many are joined into colonies, such as the various species of *Botryllus*, which form richly coloured gelatinous incrustations on rocks and seaweeds. A familiar example of a solitary kind is *Ascidia mentula*, the sea squirt, which lives on muddy bottoms near the coast. It is greyish green in colour, and conical with two orifices. Its egg hatches into a minute tadpole-like larva which, after a few hours' free swimming, attaches itself head foremost and undergoes a degeneration.

Tunis, the cap. of the dependency of Tunisia, stands on a bay of the

same name, surrounded by lakes and marshes, 10 m. from the sea, and 27.5 m. N.W. of Tripoli. Its port is Goletta, but a channel opened in 1893 has made T. directly accessible to ocean vessels. T. is a walled tn., and its harbour is well defended. In the centre of the old tn. is the Medina, the focus of trade and industry, built mainly from the ruins of the tns. of Thunes, Carthage, and Utica. The new tn. is European and E. of the Medina, and is rather unhealthily situated. Velvets, silks, linen, and fez caps are manufactured. There are many mosques, with a Mohammedan university in the Great Mosque, and the houses are nearly all built of stone. Pop. est. at 186,000. Consult N. Faucon, *La Tunisie avant et depuis l'occupation française*, Paris, 1893; Besnier and others, *La Tunisie au Début du XX^e Siècle*, Paris, 1904; De Lanesscen, *La Tunisie*, Paris, 1917; L. E. Douglas, *Behind Tunisian Walls*, London, 1923; Beauchamp, *La Tunisie*, Tunis, 1927.

Tunisia: A dependency of France in N. Africa, lying on the Mediterranean Sea, between Algeria on the W. and Tripoli on the E., with an area of 50,000 sq. m., including that portion of the Sahara lying E. of the Beled Djerid, extending towards Gadames. The pop., mainly Bedouin Arabs, Kabyles, and Jews, is about 2,160,000. The surface is mountainous in the interior. The region in the neighbourhood of the Mediterranean coast is fairly well watered and fertile, but towards the central table-land, bordering on the Sahara, the soil is very poor, and the dry climate makes cultivation difficult. Notable droughts occurred in 1908, 1909, and 1914. The climate is continental, with shorter transition periods than in France. The greater part of T., about seven-tenths, is useless for agriculture, but the rest is fertile and the natives are hard-working. The chief industry is agriculture, the principal products being wheat, barley, oats, maize and sorghum, chick-peas, and potatoes, dates, almonds, oranges, lemons, shaddocks, alfalfa grass, cork, pistachios, and henna. Much wine is made and olive oil is produced. Though the native wool is of an inferior quality, the Algerian sheep have been acclimatised. The breed of horses is steadily improving, and pigs are profitable. The mineral resources are being developed, and lead ore, zinc ore, phosphates, the output of which increases yearly, and iron are worked. Lignite and particularly manganese mines are developing rapidly, and bronze is manufactured. The chief ports are Tunis and Bizerta, while

there is good harbourage at Gabes, Sfax, and Susa. The native industries include spinning and weaving wool for garments, leather embroidery, saddlery, pottery, slipper making, and matting. Tanning and silk-weaving are declining. The fisheries (tunny, sardines, anchovies) are also important, being mainly in the hands of the Tunisians, Gks., Maltese, and Italians and employing in 1929 over 12,000 men. T. imports mainly textiles, largely from England, manufactured metals, hides, yarns, timber, and cereals, and exports grains, cereals, crude metals, beverages, and wines, fruits, and seeds, etc. T. is ruled by Sidi Ahmed Bey, who succeeded his cousin in 1929. The same family has been on the throne since 1705. In 1883, T. was made a protectorate of France and the gov. is carried on under the direction of the Fr. foreign office. Education is not compulsory, but schools provide for the primary education of all races. Tunis has a Mohammedan university. See M. Monmarche, *Algérie-Tunisie*, 1927; W. B. Worsfold, *France in Tunis and Algeria*, 1930.

Tunkers, see DUNKERS.

Tunnelling. The art of T. is a very anct. one, and was improved by the Roms., many of their rock-cut tombs and sepulchres being wonderful specimens of workmanship. The Mont Cenis tunnel, the first to pierce the Alps, was a great advance in modern T. Rock-drills worked by compressed air were used, and this fact, together with the excellent ventilation and the use of the 'shield' and iron lining, greatly facilitated the work and lessened the danger. The system adopted in England is to set out the centre-line of the tunnel on the surface of the ground. Shafts are then sunk at suitable points. From the bottom of these shafts the heading work is commenced in each direction. The top portion or heading is excavated and the crown bars and poling boards set in position; the size of the crown bars depending entirely upon the weight of earth to be supported. The heading is brought up to the requisite width, and all the upper timbers are placed in position. Sinking proceeds to the level of the bottom sill or timbers and the upper sill is supported by vertical props while raking shores are fixed. Sections are thus excavated of sufficient length to allow the centering to be placed in position, upon which the lining of brickwork is built. Upon the completion of one section, the crown bars are drawn forward to support the crown of the next section to be excavated. The thickness of the brickwork or other lining depends,

of course, upon the weight of material to be supported. The system adopted in America consists in timbering the whole heading, the timbering remaining as the lining of the tunnel. Under the Belgian system, the top heading is first excavated, the upper cone being removed so as to allow the crown of the arch to be built. The arch is then underpinned and the side walls built up to the springing. Two parallel headings are constructed in the Ger. method and the side walls then built. When the upper portion of the heading is removed the arch is built, the centering being supported by the unexcavated material, part of which is left until the last for this purpose. It will be seen that the timbering is more economical than in the Eng. system. Experience shows that sandstone is the easiest material to tunnel through, while igneous rock is the most difficult. The latter, however, requires no lining. Running sand is most difficult and dangerous to tunnel through, and requires a great quantity of timber. All tunnels are constructed with a sufficient gradient to allow the water to drain off. A sewer is also constructed down the middle of the tunnel under the surface, having inlets from gulleys on either hand. In some cases, an open channel is formed to carry the water away. In constructing tunnels under rivs. and other waterways, the ordinary methods may be adopted so long as the earth or formation above is impermeable to water. At all times, however, water in large quantities may be encountered, and pumping will have to be resorted to to prevent flooding. The Severn Tunnel is $4\frac{1}{2}$ m. long, and is the longest in England. It was in course of construction from 1873 to 1886. Headings were driven from the shores and a lining of vitrified brick built in Portland cement was used. The gradients at the entrances are 1 in 90, and 1 in 100, and the centre portion is level. The tunnel under the Mersey between Liverpool and Birkenhead was in course of construction from 1880-86, and is $1\frac{1}{2}$ m. long. The gradients at the ends are 1 in 27 to 1 in 30, and the central gradient is 1 in 900. The cost per yard including all rolling stock and stations was £284. The Simplon Tunnel through the Alps is $12\frac{1}{2}$ m. long, and was opened in May 1906, having been under construction from 1898. This work consists of two single-line tunnels, and is the longest tunnel in the world. There is a gradual rise of 1 in 500 for $5\frac{1}{2}$ m. from the N. end, when the gradient becomes 1 in 143 to the Italian end. There are cross-

connecting tunnels between the two traffic tunnels every $\frac{1}{2}$ m. The trains are hauled through the tunnels by electric locomotives. While the work was being carried out, considerable difficulty was experienced by the inrush of springs of hot water. Brunel was the inventor of the shield system of T., and it was first used to construct a tunnel under the Thames near London Bridge in 1825. The lining of the tunnel was of brickwork, and the shield was pushed forward by screws as the work proceeded. The same system was adopted by Barlow in constructing the second tunnel under the Thames, but he lined the tunnel with cast iron. Greathead also employed this system very largely, and it is now generally favoured in constructing deep tunnels, especially for electric railways. It allows of a minimum of disturbance on the surface and at the same time greater speed is obtained in the work of T. The speed obtained for the construction of ordinary brickwork tunnels is at the rate of about 1 ft. per day, but the rapid speed of 6 in. per hour was obtained in constructing the Central London Railway Tube, and was maintained throughout the work. Greathead's shield consists of a cylindrical casting about 2 in. larger in diameter than the cast-iron lining of the tunnel. A series of hydraulic rams are spaced equally round this casting, the piston heads pressing against the iron lining at the rear. The front of the shield consists of segmental castings to which are fastened steel plates forming a conical cutting surface. A diaphragm plate is fixed behind the castings and access to the working face is obtained through a rectangular opening in this. The men work in a heading which has been constructed in front of the shield, and the shield is pushed forward by the rams. The space left by the shield around the lining is filled by grouting under pressure. *See also* GREATHEAD; RAILWAYS—*Underground Railways and Tunnels*. Open shield T., for subways or tunnels under rivs., with open headings and ordinary atmospheric conditions, is only half as costly as pneumatic or closed shield T. The latter is used for excavations in waterlogged ground, under air-pressure, the closed shield having bulkheads and airlocks, to admit and remove materials, workmen, etc. For scales of costs consult Kempe's *Engineering Year Book*, 1928 edn.

American Tunnels.—The longest tunnel in N. America is the Cascade Tunnel, constructed by the Great Northern Railway through the Cascade Mountains in the state of

Washington. It is 7.79 m. long and cut through solid granite, perfectly straight. It was dedicated by President Hoover in 1929. Another famous tunnel is the Moffat which cuts through the Rocky Mountains in the state of Colorado at the Continental Divide. It is on the Denver and Rio Grande Railway, 39,560 ft. long. One of its peculiarities is the height at which it was bored, over 9000 ft. above sea level. The longest in Canada is the Connaught, built by the Canadian Pacific Railway through the Selkirk mountains in British Columbia. It is 5 m. long. There are two notable tunnels connecting the U.S.A. and Canada. The Detroit is under the Detroit riv., and connects Detroit with Windsor, Canada. It was built by the Michigan Central Railway. The other is the St. Clair, built under the St. Clair riv., connecting Sarnia, Ontario, to Port Huron, Michigan. For many years the longest tunnel in N. America was the Hoosac through the Hoosac Mountains in Massachusetts— $1\frac{1}{2}$ m. long. The city which has more tunnels than any in the world excluding those for underground railway service is New York City. The Holland Vehicular consists of two tubes under the Hudson riv. 9250 ft. long, connecting New York City with the state of New Jersey. The Pennsylvania Railway System has a series of tunnels by which its trains leave New York City and pass under the Hudson riv. into New Jersey. In addition, there are over a dozen more, including tunnels under the Hudson, East, and Harlem rivs., connecting New York City with New Jersey, Brooklyn and the main portion of Long Island.

Tunney, 'Gene' (real name, either John Joseph or James Joseph), American puglist; who, at Philadelphia, Sept. 23, 1926, in view of the largest crowd ever gathered to a boxing contest, defeated Dempsey, holder of the world-championship, in the tenth round. He defeated Dempsey again—not so satisfactorily—at Chicago in 1927. In 1928 he defeated Heeney at New York, married, and retired from the ring.

Tunny (*Thunnus thynnus*), a large teleostean fish of the family Scombridae, allied to the mackerel. It is abundant in the Mediterranean, where its fishery has been an industry since anct. times. It attains a length of 10 ft. and a weight of 1000 lb.

Tunstall, Cuthbert (1474–1559), an Eng. prelate and distinguished scholar, studied at Oxford, Cambridge, and Padua. He held several livings, was Master of the Rolls, dean of Salisbury, bishop of London, then of Durham,

and keeper of the Privy Seal (1523). He was employed by Henry VIII. and Wolsey on diplomatic business abroad and formed a friendship with Erasmus. He accepted the royal supremacy in religion, but disliked the reforms of Edward VI. and was deprived of his see (1552). Restored under Mary, he was again deprived under Elizabeth, and d. a prisoner at Lambeth.

Tupi-Guarani, the name of two important tribes of S. American aborigines, extending from the Amazon to the Lower Paraguay and the Peruvian Andes. At one time there were numerous Jesuit missions, especially among the Guarani. A corruption of the Tupi language is spoken as the trade medium in the Amazon region. The Tupian tribes surpassed the other Brazilian aborigines in culture and civilisation.

Tupper, Sir Charles (1821-1915), a Canadian statesman, b. at Amherst, Nova Scotia. He studied medicine at Edinburgh and practised in his native tn. He was prime minister of Nova Scotia, 1864-67, and in 1870, after the Act of Union came into force, he became a member of the Canadian Privy Council and Minister of Inland Revenue in 1872; Minister of Customs, 1873. Returned to office in 1878 as Minister of Public Works. In 1884 he was appointed Canadian High Commissioner in London, resigning his seat in Dominion Parliament, and again in 1888. During the interim, 1887-88, he was Finance Minister in the Canadian Conservative Government. In 1896 he became Prime Minister, succeeding Sir Mackenzie Bowell, holding that office for six months. *Pub. Recollections of Sixty Years*, 1914. *See Life* by E. M. Saunders, 1916.

Tupper, Martin Farquhar (1810-89), an Eng. author, b. in London. He pub. much poetry, including *Proverbial Philosophy* (1839-76), which was immensely successful, but is turgid and commonplace. His Autobiography appeared in 1886.

Turanian, a philological term applied to one of the great classes of human speech, including all the Turki peoples of Central Asia. It was extended to almost every non-Aryan race in Asia and so ceased to have much value, and is obsolete.

Turbary, in law, *common of Turbary* is the right which a tenant enjoys of digging turf from the waste lands of a manor (*see* COMMON, RIGHT OF).

Turbellaria, *see* PLATYHELMINTHES.

Turberville, or Turberville, George (1540?-1610), an Eng. poet, of an anct. Dorsetshire family, b. at Whitchurch. Educated: Winchester and Oxford. Pub. in 1570 *Epitaphs*,

Epigrams, Songs, and Sonnets; also books on *Falconrie* and *Venerie* (1575).

Turbines, Steam. A turbine is a rotary engine, consisting essentially of a shaft carrying a number of vanes or blades; jets of steam, directed against these, cause the shaft to rotate at a high speed. Modern steam turbines consist of: (1) a rotor, which may be a solid forged steel drum, or a number of forged steel discs fixed on a shaft; (2) a casting or cylinder, usually of cast iron, inside which the rotor revolves: it is made in two halves bolted together along the centre line, to allow the rotor to be inserted or removed; (3) a large number of blades, usually machined from stainless iron or steel, which occupy the annular space between the rotor and the cylinder. They are arranged in circular rows round the turbine, alternate rows being attached to the rotor and cylinder, so that the steam, passing along the cylinder from the high pressure to the low pressure end, meets fixed and moving blades alternately. In certain types of turbine, rows of nozzles are used instead of some of the rows of fixed blades.

Theory of the Steam Turbine.—(a) *Steam Jets, and the Use of Steam Tables.* In steam turbines, the heat energy of the steam is first employed to set the steam itself in motion, giving it kinetic energy, and this in turn does work on the blades. As heat and work are both forms of energy, for any steam jet we can equate the gain in kinetic energy of the steam to the corresponding loss in total heat. If m lb. steam have their velocity increased from v_1 to v_2 , with a corresponding drop in total heat from I_1 to I_2 , we get:

$$m \frac{v_2^2}{2g} - m \frac{v_1^2}{2g} = m(I_1 - I_2)J.$$

(J = Mechanical Equivalent of Heat, *see* STEAM ENGINES.—*Thermodynamics*). Hence $(v_2^2 - v_1^2) = 2gJ(I_1 - I_2)$, which is a fundamental equation for all steam jets. In turbines, the initial steam velocity is always small, so v_1^2 may be neglected; then if the velocity is measured in ft./sec., and the total heats in C.Th.U./lb. steam (*see* STEAM), $g = 32.2$ and $J = 1400$, and we get: $v_2 = 300\sqrt{I_1 - I_2}$. To apply this equation, I_1 is found from steam tables or a Mollier diagram (*see* STEAM), knowing the pressure and temperature of the steam at admission. If the steam be then expanded in a perfect nozzle to a lower pressure, the value of I_2 can be found by drawing a vertical line on the Mollier diagram

from the point I_1 to the line corresponding to the lower pressure; the length of this vertical gives ($I_1 - I_2$) directly. For example, consider steam expanding through a perfect nozzle from a pressure 100 lb./sq. in., and temperature 375°C , to a condenser pressure of 1 lb./sq. in. The heat drop ($I_1 - I_2$), from the Mollier diagram, is $(764 - 559) = 216 \text{ C.Th.U./lb.}$, and the theoretical steam velocity is thus $300\sqrt{216}$ or 4410 ft./sec. As perfect nozzles do not exist, the actual velocity would be about 4200 ft./sec.

(b) *Division into Stages.*—The best efficiency is obtained in a turbine when the blade speed is about half

over; they are nowadays used only in very small single-stage turbines for driving auxiliaries, such as boiler feed pumps, etc.) The velocity thus acquired is communicated to the moving blades by impulse; that is, the blades receive steam at high velocity, and, after extracting all or part of its kinetic energy, discharge it again at reduced velocity, without change of pressure. The passages between the blades are of uniform cross-section, with the blades set square in the blade rows (see Fig. 1). The velocity of the steam is usually

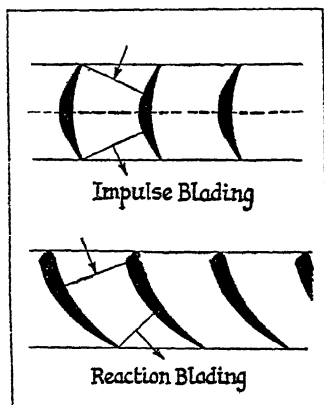


FIG. 1

the steam velocity. Blade speed is limited by considerations of centrifugal force, which tends to make the rotor and blades fly to pieces; therefore blade-tip speeds rarely exceed 1000 ft./sec. (about 680 m.p.h.). This would give a very low blade efficiency with a steam velocity of 4000–5000 ft./sec. (above), and therefore the steam is expanded in a number of stages, to give a low velocity in each stage, comparable with the blade speed. Turbines are classified as *Impulse* or *Reaction* according to how the steam is expanded.

(c) In *Impulse Turbines*, expansion of the steam takes place wholly in fixed nozzles, which are usually of the convergent type. (Convergent-divergent nozzles are necessary only for large pressure drops, corresponding to steam velocities of 1800 ft./sec. or

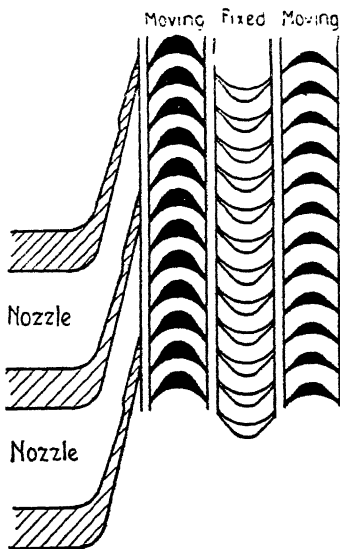


FIG. 2

taken up in one row of moving blades; but in some designs two or three rows are used, the steam being re-directed between each row by a row of fixed blades (see Fig. 2). This is called 'velocity compounding'; with two such velocity stages, as shown, the blade speed is about halved. All the blading between one row of nozzles and the next, being at a constant pressure, is called a pressure stage; an impulse turbine may contain from 3 to 50 pressure stages, each of which may consist of 1, 2, or 3 velocity stages. The efficiency of an impulse turbine depends considerably on the state of the entering edges of the blades, which are made sharp to divide the high velocity steam

neatly, without eddies. Reduction of this sharpness reduces the efficiency, and therefore impulse turbines are very sensitive to erosion (see *Reheating*), which attacks the entering edges of moving blades. An impulse turbine is most effective at the high pressure end; when very highly superheated steam is used, part of the heat is taken out of it by expansion in the first row of nozzles, before ever the blades are reached, thus reducing the stresses in the moving parts; the steam is dry, so there is no erosion; and, there being no pressure drop across the blades, there can be no question of blade leakage—packing need be provided only where the nozzle-plate meets the rotor.

(d) In *Reaction Turbines*, the fixed and moving blades are identical in form, and expansion takes place equally in both. The passages between the blades are shaped like convergent nozzles, by setting the blades aslant in the blade rows (see Fig. 1). Rotation of the moving

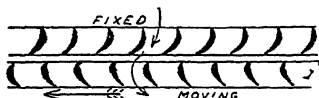


FIG. 3

blades is partly due to the impulse of the steam's velocity, acquired by expansion in the previous row of fixed blades; but mostly due to the reaction of the steam on the moving blades, as it gains velocity by expansion there. A pair of rows of blading (fixed and moving) is called a stage (see Fig. 3); there may be from 10–200 stages in a reaction turbine. Reaction blading is more efficient than impulse blading, and the efficiency depends on the condition of the leaving edges of the blades, where the steam velocity is highest; the entering edge can be made comparatively blunt to withstand erosion without weakening, and it will not affect the blade efficiency appreciably. In a reaction turbine there is a pressure drop across each row of blades, and very small clearances are necessary to prevent leakage of steam past the blade tips. For these reasons, reaction blading is most effective at the low-pressure end of a turbine; at the high-pressure end the blades are very small, and the leakage proportionately large. The pressure drop across the moving blades causes an end thrust on the rotor, which requires balancing (see *Reaction Turbines*, below).

(e) *Reheating*.—As steam expands through a turbine, it first loses superheat, and then becomes wet. A small degree of wetness in the last few stages is unimportant, as the water has no time to separate out before it reaches the condenser. With a high degree of wetness, however, the unyielding drops of water strike the entering edges of the blades at a high relative velocity, and rapidly wear them away (erosion). Using steam at low or normal pressures, condensation can be reduced by adopting very high superheat temperatures; but the materials employed in superheater and turbine construction, which rapidly lose strength above 500° C. (dull red heat), put a limit to this. With high pressures (500–1500 lb./sq. in.), even steam at red heat will not prevent condensation, and in several large modern turbines, therefore, steam is withdrawn after partial expansion and reheated in a re-superheater (combined with the boiler, or separately fired) before being returned to the turbine. This eliminates condensation, and so enables high pressure steam to be used. For reheating, multi-cylinder turbines are usual, the steam being reheated between the h.p. and l.p. cylinders.

(f) *Sources of Loss*.—(1) Friction. Steam, passing through the blading and nozzles of a turbine at high speed, is retarded by friction, and the full theoretical velocity is not obtained. To minimise this loss, modern turbines have a large number of stages, and small steam velocities in each stage. Blades are made of stainless steel and finished smooth; any pitting or corrosion in service greatly increases frictional losses. (2) Eddies are set up at the blades if the entering edges are eroded, or if the steam strikes them at a slightly wrong velocity or angle. This may occur if the boiler is not giving its full superheat temperature, so that the calculated heat drop is not obtained; or, in the final stages, if the condenser circulating water is colder than usual (perhaps due to a frost). Eddies are so much wasted energy, as the steam velocity in them is dissipated in friction. Both friction and eddies make the steam slightly hotter and drier at each stage than it theoretically should be (friction being a transformation of mechanical energy into heat), and condensation in the turbine is thereby delayed. (3) Leakage of steam past the blade tips occurs only in reaction turbines (*q.v.*), and depends on how small the clearances between fixed and moving blades can be made; it can never be entirely eliminated. (4) Leakage

of steam through the packing occurs at the high-pressure gland, where the shaft passes through the casing, and also (in impulse turbines) at each nozzle-plate, where it meets the rotor. At the low-pressure gland, the turbine is at condenser pressure (sub-atmospheric), and consequently air leaks inwards. The air pump must therefore be made larger (see *Forms of Condenser*), and so absorbs more power. (5) *Residual velocity*. The steam leaving the last row of blades has a certain velocity, corresponding to a small amount of energy in the steam; this is not transferred to the rotor, and so is counted as a loss. (6) *Supersaturation*. Steam passes so rapidly through a turbine (1/2 sec., or less) that water has no time to separate out at the condensation point, and the steam becomes supersaturated; in this state, it is cooled below its normal temperature, and so has less energy to impart to the blades. The lost energy is evolved later as heat in the condenser, where it is not wanted. A compensating advantage is that erosion is somewhat reduced. (7) *Radiation* is reduced by careful lagging of all parts. In land turbine plant of 3000 H.P. and over, these losses reduce the actual turbine efficiency to 80-85 per cent. of the theoretical. With marine turbines, which work under less favourable conditions, and smaller land turbines (down to 300 H.P.), where the losses are greater in proportion, the efficiency may fall to 60 per cent. of the theoretical.

The Exhaust from a Turbine.—(a) *Advantages of Condensing*. There is almost as much energy in a lb. of steam expanding from 5 to 4 lb./sq. in. pressure as in a lb. of steam expanding from 500 to 450 lb./sq. in., a pressure drop fifty times as great. For, although the pressure is very low (sub-atmospheric), the volume of the steam is enormous, and work done is measured by (pressure \times volume). These large stores of energy cannot be used in reciprocating engines, as cylinders cannot be made large enough to deal with it (see *STEAM ENGINES.—Sources of Loss*); but the final or low pressure rows of turbine blades can be made as large as required; and, if one row is insufficient, the steam flow can be divided a few stages before exhaust, and made to pass through two or more low pressure sections in parallel (multiple exhaust). The steam turbine is most efficient at the low-pressure end: at high pressures, a piston and cylinder may even be preferable. But these low sub-atmospheric pressures cannot be

attained without condensing the exhaust steam, and the lower the exhaust pressure, the larger the condenser. Thus the condenser—a minor auxiliary in reciprocating

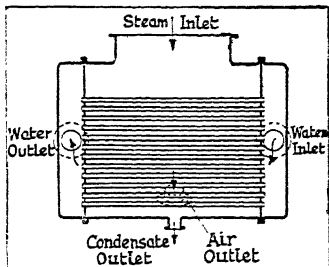


FIG. 1

steam engines—becomes a vital component in steam-turbine practice, ranking in importance with the boilers and the turbine itself, and often occupying a greater space than the turbine it serves.

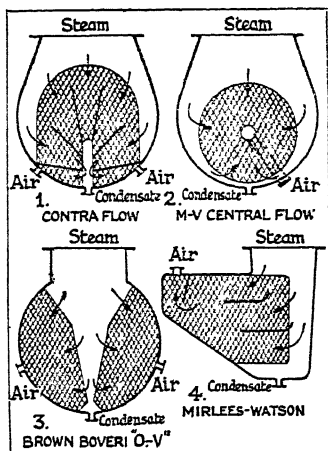


FIG. 5

(b) *Forms of Condenser*.—These are usually of the surface type (see *STEAM ENGINES.—Condensing Engines*), consisting of a large vessel of cast iron or mild steel plate, closed at the ends by two tube plates of brass (or occasionally steel), and traversed by

a large number of brass tubes (see Fig. 4); cold water (circulating water) passes through the tubes, on the outside of which the exhaust steam is condensed. The condensed water (condensate) drips off the tubes, and is withdrawn from the bottom of the condenser by a small rotary or reciprocating pump, which delivers it to a hot well for feeding to the boilers. The air and other uncondensed vapours always present in steam, due to leakage, etc., are extracted by a rotary air pump, or a steam or hydraulic ejector, through a separate outlet; the position of this varies in different types of condenser (see Fig. 5) according to the direction in which the steam is required to flow. Steam always travels from the exhaust inlet, over the tubes, to the air outlet, and this 'steam path' should be as short as

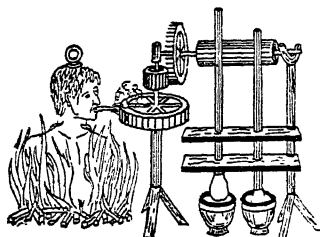


FIG. 6

possible, to reduce the pressure drop in the condenser. Without an air pump, the air would accumulate and mount up in pressure, and soon destroy the vacuum. The circulating water is forced through the condenser tubes by the circulating water pump; in land turbine installations, this water is usually obtained from, and passed back into, an adjacent river; in the absence of such, the circulating water, after traversing the condenser, is cooled in a cooling tower and used again. In marine practice, sea-water is used. Condensers for steam turbines give back pressures varying from 2 to $\frac{1}{2}$ lb./sq. in., corresponding to vacua of 26 to 29 in. (zero pressure = 30 in. vacuum).

(c) *Back Pressure Turbines, etc.*—Low pressure steam for process work or heating, which must be uncontaminated by oil, can safely be taken from the exhaust or intermediate stages of a turbine. This has the advantage, over the use of low pressure boilers to provide the steam, that power for driving machinery can be obtained as a by-product; it is almost as cheap to generate

steam at (say) 250 as at 50 lb./sq. in., so that the only expense is the initial cost of the turbine. Turbines from which a part of the steam is withdrawn before exhaust, the rest being expanded to condenser vacuum, are called *Pass-Out* or *Extraction* turbines; where all the steam is used, they are called *Back Pressure* turbines. A small amount of steam is often passed out or 'bled' from ordinary turbines at different stages for heating the boiler feed water.

Governing of a Turbine (see also STEAM ENGINES.—Governors).—Turbines driving electric alternators require very sensitive governors to keep the frequency of the electric supply constant; but they must also be able to shut off steam rapidly and completely in the event of a failure on the electrical side, otherwise the turbine will 'run away' when the load is suddenly removed by the circuit-breakers. In most turbines, the main steam valve is operated by oil under pressure, supplied by a pump on the end of the turbine shaft. The governor, of the horizontal spring-controlled type, controls the supply of oil, and thus varies the steam supply as required. In case of failure, an emergency governor, set at a slightly higher speed than the main governor, trips an emergency steam valve, which is normally kept open, against a powerful spring by a trigger; once tripped, this cannot be re-set until the turbine has stopped. In reheating turbines, further rise of speed trips a valve between the re-superheater and the l.p. cylinder, since the steam in the former may be sufficient to raise the turbine speed to a dangerous value, even when the main steam valve is closed. A fourth line of defence is a vacuum-breaking valve on the condenser.

Forms of the Steam Turbine.—(a) *Impulse Turbines.* The first impulse turbine was constructed by Branca in A.D. 1649 (Fig. 6), but it was only a scientific toy. The first successful design, patented by de Laval in 1888, had a single row of blades with convergent-divergent nozzles, and rotated at an extreme speed (30,000 r.p.m.). The losses due to friction and residual velocity were, however, unavoidably large, and the steam consumption high. A large modern impulse turbine, built by the Metropolitan-Vickers Electrical Co., Ltd., of Manchester, for driving a 50,000 kilowatt alternator (= 67,000 H.P.), is shown in Fig. 7. It has two cylinders, to minimise expansion stresses; these can be very large when one end of a cylinder is at the temperature of highly superheated steam (450° C. or over), and the other

at the temperature of the condenser (down to 30° C.). The two rotors are mounted on separate bearings, and are connected to each other and to the alternator by flexible couplings. The rotors consist of forged steel discs pressed on a steel shaft, with blades of nickel steel or stainless steel. The high pressure (h.p.) cylinder is of cast steel, to withstand high temperatures and pressures, while the low pressure (l.p.) cylinder is of the cheaper cast iron. The h.p. turbine has twenty-

by Messrs. Parsons & Co., Ltd., of Newcastle, for driving a 20,000 kilowatt alternator (= 27,000 H.P.), is shown in Fig. 9. It has a single cylinder in two sections bolted together, the h.p. end of cast steel, and the l.p. end of cast iron. There are thirty-five stages, of which the last four are duplicated (duplex exhaust); for overload, additional steam is admitted at the eighth stage; and steam is 'bled' at two points for feed-water heating. The rotor is a

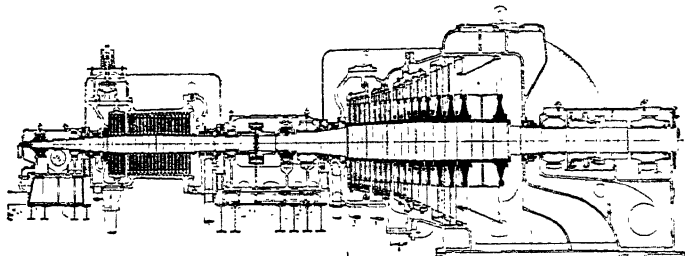


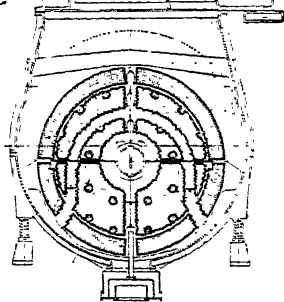
FIG. 7

CROSS SECTION OF TYPICAL METROPOLITAN-VICKERS 50,000 K.W. TWO-CYLINDER TURBINE AND CENTRAL-FLOW CONDENSER

(By courtesy of the Metropolitan-Vickers Electrical Co., Ltd., Manchester)

three pressure stages, and the l.p. eighteen, without velocity compounding; this is a large number (some impulse turbines have only four pressure stages), but the modern tendency is to reduce the steam velocity by increasing the number of stages (see *Sources of Loss*). Steam is admitted to the turbine at the first stage, with provision for overload by admission of additional steam at the sixth stage. The large increase in blade height in the final stages is noticeable, as also the divided exhaust in the last two stages to increase the exhaust blade area yet further (see *Forms of Condenser*). Steam is 'bled' from four points in the l.p. cylinder for feed-water heating. A central flow condenser is fitted, mounted on springs, which take the weight but allow the condenser to expand with the turbine cylinder.

(b) *Reaction Turbines*.—The reaction turbine was first given form in 120 B.C. by Hero of Alexandria (Fig. 8), but the first practical machine was built by Parsons in 1884, and is now in S. Kensington Museum; it had an enormous steam consumption, but nevertheless showed that the principle was correct. A large modern reaction turbine, built



large, one-piece, steel forging, bored down the middle to reveal any interior flaws; the blades are of stainless steel, supported at their free circumference by a Monel-metal shroud ring. This is wider than the blades, and clears the adjacent blade rows by only a few thousandths of an in.; steam leakage past the blade tips is thus minimised. An adjustable thrust bearing is provided at the h.p. end of the rotor to adjust these clearances. The shroud ring is finished with a sharp edge, which, in case of fouling, merely becomes blunted without damaging the rest of the turbine. The end thrust on the rotor is balanced by two dummy pistons at the h.p. end; in large multi-cylinder reaction turbines the steam from the h.p. cylinder is often led to the middle of the l.p. cylinder and expanded in both directions,

exhausting at the two ends into two separate condensers; thus the exhaust area is doubled compared with a single-cylinder machine, and the l.p. rotor is balanced and needs no dummy pistons.

(c) *Double Rotation Turbines*.—A reaction turbine of singular and ingenious design, built by Ljungström's Steam Turbine Co., of Stockholm, is shown in Fig. 10. It drives two 25,000 kilowatt alternators (= 67,000 H.P. in all) by two disc-shaped rotors, mounted face to face and rotating in opposite directions. In the space between the rotors are thirty-six concentric rings or rows of reaction blading, attached alternately to each rotor by special

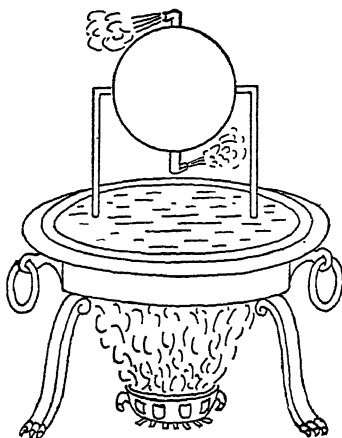


FIG. 8

expansion rings; there are also four ordinary rows of blades, two on each rotor, mounted in the usual manner. This may be called a 20-stage machine, with duplex exhaust in the last two stages. Steam is admitted to the centre of the turbine between the rotors, and expands radially outwards; for overload, additional steam is admitted at the sixth stage. The Ljungström double rotation turbine is very compact and efficient, since: (1) for a given rotor speed (which is limited by centrifugal force considerations) the relative blade speed is doubled; hence the steam velocity can be doubled, and a quarter of the number of stages only need be used for the same heat drop; (2) the ingenious detail design permits

very small clearances, and hence minimum steam leakage past the blades, without danger of fouling; (3) elimination of turbine bearings, by overhanging the rotors on the alternator bearings, reduces friction. The chief drawback is that two alternators are necessary.

Uses of the Steam Turbine. (a) *Land*.—The steam turbine is the principal source of power on land, owing to its suitability for large units, the small space required for such units, simplicity (no large quantities of small moving parts, such as pistons, valves, rods, etc.), even torque, perfect balance, high speed, great efficiency, silence, large overload capacity (by admitting boiler steam at later stages), and use of almost any kind of fuel (by suitable boiler design). The limit to turbine sizes is an economic one; turbines have been built up to 280,000 H.P., and could be built larger if required, but it is very rarely that anything larger than 100,000 H.P. is economically justifiable. Down to 10,000 H.P. the turbine has no rival, and down to 5000 H.P. other forms of prime mover are rarely used. From 5000 H.P. down to 300 H.P., reciprocating engines come increasingly into favour, as turbine losses become large in such sizes, and feed-water heating, reheating, etc., become disproportionately expensive; boilers also are troublesome in small sizes, and these the internal-combustion engine avoids. (Apart from prime movers, the electric motor holds the field, fed by current generated by the larger steam turbines.) Below 300 H.P., the steam turbine is relatively inefficient. Steam turbines are used primarily in large central power stations for generating electricity at high voltage on the three-phase system, and thus form the backbone of the power supply in nearly every country. The speed of such machines varies from 1500 r.p.m. to 3600 r.p.m., according to the frequency of the electric supply. Turbines are also used: (1) in medium electric power stations, for factories and small towns; (2) for driving machinery in cotton mills, etc., by reduction gearing, belts, and overhead shafting; (3) for blowing large furnaces in steel and iron works, and for ventilation of mines (turbo-blowers); (4) in sugar works, paper mills, etc., where steam is needed, to obtain electric power as a by-product (see *Back Pressure Turbines*, etc.); and (5) wherever large powers are required. Modern turbine plant has a very high overall thermal efficiency (from coal burnt to electricity delivered) (see STEAM

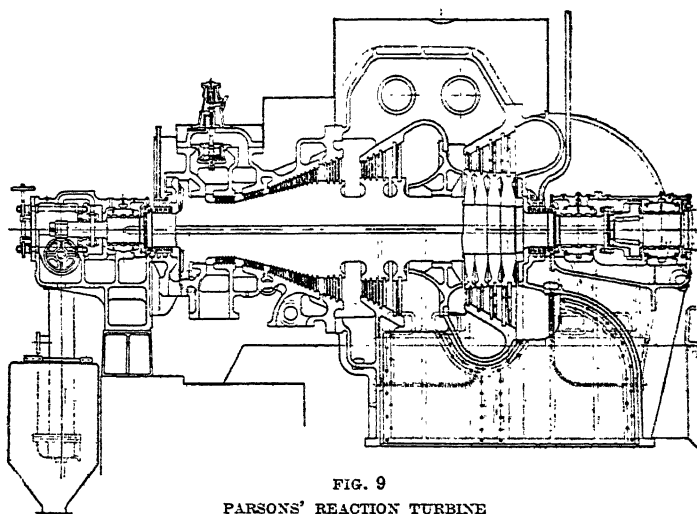


FIG. 9

PARSONS' REACTION TURBINE

(By courtesy of Messrs. C. A. Parsons & Co., Ltd.)

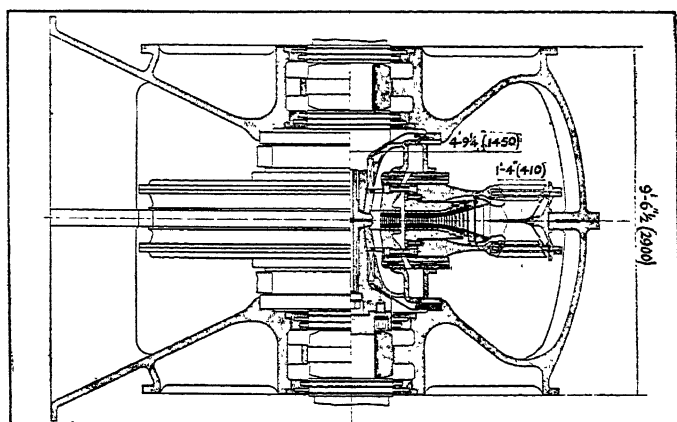


FIG. 10

LJUNGSTRÖM'S DOUBLE-ROTATION TURBINE

(By courtesy of A. B. Ljungström's Ångturbin, Stockholm, Sweden)

ENGINES.—*Thermodynamics*), particularly in the larger sizes; 25–35 per cent. is a usual figure, and 36·8 per cent. has been reached in a recent 50,000 kilowatt turbine, using steam at 600 lb./sq. in., superheated to 425° C., with reheating to 425° C. after partial expansion; exhausting to a condenser vacuum of 29 in.; feed-water heating to 170° C.

(b) *Marine*.—The first turbine-driven ship was the *Turbinia* (1897), a small vessel built by Parsons to demonstrate his marine steam turbine to the Admiralty. It had three cylinders (h.p., i.p., and l.p.) driving three propeller shafts, and reached a speed of 34·5 knots (1 knot = 1 sea-m. per hour = 1·15 land-m. per hour). The first naval vessel fitted was the destroyer *Viper* (1900), speed 36·5 knots (compared with 28 knots for previous destroyers); and since 1905, when the *Dreadnought* (23,000 H.P.) was so equipped, all naval war vessels of all classes have been fitted with steam turbines. The first merchant ships with turbines were the *Victorian* and *Virginian* of the Allan Line, soon followed by the Cunard liner *Carmania* (21,000 H.P., 1905); she proved so satisfactory that the two enormous Cunard mail steamers *Lusitania* and *Mauretania* (67,000 H.P., 1907) were equipped in the same way, giving a speed of 26 knots. Since then, most large liners and many smaller vessels have been turbine driven; a notable example is the Clyde steamer *King George V.* (3500, H.P., 1926), with high-pressure boilers (550 lb./sq. in.), superheaters and geared turbines. The screw propeller, unlike the turbine, is a slow-speed mechanism (up to 200 r.p.m.), but turbines always used to be direct coupled, for lack of reliable gearing, and because thrust-block troubles (which were serious) could be overcome by balancing the propeller thrust against the end thrust of a (reaction) turbine. The turbines had a large number of stages (up to 200) to give a low steam velocity, in three or four cylinders driving different propeller shafts. The rotors were of enormous diameter to give a reasonable blade speed, which meant very short blades (with so many in each row), and proportionately large blade-tip leakage. Geared turbines were introduced in 1911, and came into general use during the Great War, after the Michell thrust block had solved thrust troubles. Gearing enables turbine and screw to run each at its optimum speed, giving a smaller and lighter turbine, and a more efficient propeller. Turbines will not run backwards; reversing is therefore effected by special

reverse turbines, which are cut out when the vessel is moving forward. Turbines are uneconomical if not run at their designed speed; this does not affect merchant vessels, which run at one speed, their maximum; but to give economy in naval vessels when running at cruising speed (about half full speed), small multi-stage cruising turbines are sometimes fitted, to expand the steam partially before it reaches the main turbines. At full speed, the cruising turbines are cut out. (Plan of warship's engine-room, see Fig. 11.)

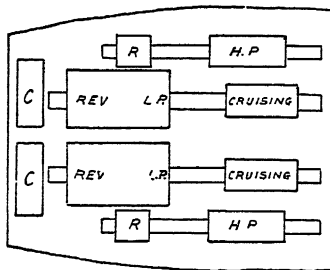


FIG. 11

Turbot (*Rhombus maximus*), a flat fish, which, like the brill, a member of the same genus, has the eyes on the left side, the ventral eye being anterior to the dorsal. It has no ordinary scales, but pointed tubercles scattered in the skin. It is a shallow-water fish most abundant on the North Sea trawling grounds.

Turenne, Henri, Vicomte de (1611–75), a Fr. general, second son of Henri, Duc de Bouillon, and of Elizabeth of Nassau. In 1630 he was sent by his mother as a hostage to the Fr. court in order to avert the designs of Richelieu against the sovereignty of his brother, the Duc de Bouillon, still a minor. T., whose reputation for military science had preceded him, was, though only nineteen, appointed to the command of a regiment of infantry. He distinguished himself at the siege of La Motte in 1634, and was appointed *maréchal-de-camp*. In 1635 T. was attached to Cardinal de la Valette, who was to co-operate with the Swedes in Germany against Spain, and T. distinguished himself in the disastrous campaign that followed. In 1639, after some further service on the Upper Rhine, he was sent to Italy, second in command to the Comte d'Harcourt. T. was now ordered to Germany, where, during the winter

1643-44 he succeeded, by raising money on his own credit, in re-equipping the army which had been raised by the Duke of Weimar, and restoring its discipline. When the disturbances broke out at Paris, at the commencement of 1649, T. rejected the overtures of Mazarin, but, finding that resistance would be vain, retired to Holland with some of his personal friends. T. returned to Paris in May 1651, and having as he said discharged his duty to Condé by procuring his release from prison, declared for the regent and Mazarin, and accepted in 1652 the command of the royal army. From 1653 to the conclusion of 1659 T.'s genius for war found ample scope in the campaigns in the Fr. and Austrian Netherlands, which were concluded by the Treaty of the Pyrenees. He fell near Salsbach, July 26, 1675.

Turf Laws, see HORSE RACING.

Turgai, a former prov. of Russian Central Asia. It is now included in the Kayak Aut. S.S.R. See KAZAKSTAN.

Turgenev (Turguenev, Turgenev, or Turgenieff), Ivan (1818-83), a Russian novelist, b. at Orel, of a decayed noble family, educated at Moscow, St. Petersburg, and Berlin. His mother, who was much older than his father, made him an allowance, which she subsequently stopped on account of T.'s passion for the operatic singer Mme. Viardot. T.'s passion, though never reciprocated, endured, and this is apparent in his works, which are coloured by Mme. Viardot's personality. Incurring the displeasure of the Czar for his polemical tone and his support of Gogol (*q.v.*), he left Russia in 1855, the rest of his uneventful life being spent at Baden and Paris with the Viardot-Garcia family. In Paris, where he lived after 1870, he became exceedingly popular, and it was through the medium of Fr. translations that his works first became world-famous. T. was indeed the first Russian author to acquire an international reputation, though he was by no means universally acclaimed among his fellow-craftsmen in Russia. His chief novels, to give the names of Constance Garnett's fine Eng. translation (14 vols. 1894-97), are: *Sportsman's Sketches*, an exposure of the utter wretchedness of Russian serfdom (1846); *A House of Gentlefolk* or *Nest of Nobles* (1859), *On the Eve* (1859), *Fathers and Children* (1862), his three finest works; *Smoke* (1867) and *Virgin Soil* (1877). Probably his greatest work was the novel *Dvoryanskoe Gnyezdo* or *Nest of Nobles* (translated by E. W. R. Sheddon Ralston into Eng. under the title of *Liza*), for

this work displays to the full his consummate artistry in portrayal of character and in the description of the scenes in which they move. '*Liza*, the heroine, reared in the noble nest, is almost the type heroine of the Russian novel, simple of nature, strong of will, not beautiful but full of charm and affected by the Slav spirit of fatalism and transcendental emotion' (Vicomte de Vogue in *Roman Russe*). T.'s earliest work, *Zapiski Okhoznika*, or *Notes of a Sportsman* (which first appeared in Eng. about 1856 as *Russian Life in the Interior*, evidently done from a bowdlerised Fr. version), a collection of sketches of country life, made a deep impression on the educated classes of Russia on account of the vigour of its attacks upon the vices of the system of slavery then prevalent. The story came out at intervals in a magazine *Sovremennik* (Contemporary) about 1846; but for long was unobtainable in complete form owing to the censors. The pathos of the wretched condition of the masses is introduced almost, as it were, accidentally, for the book is not without a fund of humour and beauty which of themselves would have ensured its vogue in Russia. *Otsui i Dyeti*, or *Fathers and Children* (trans. by Eugene Schuyler, New York, in 1867), is a somewhat polemical story, which describes the change that came over the educated classes of Russia about this time; but for most Eng. readers much of its power is lost without a thorough knowledge of what was going on in Russia when it was written. A similar objection may be made to *Duim* or *Smoke*, so much of which is devoted to caricatures of contemporary persons and opinions of note. *Neschastnaya* or *The Unfortunate*, a novelette, is a painful story founded on fact, but its intensity of gloom is, artistically, overwrought. T. wrote a great number of very charming short stories, most of them having reference to Russian life; besides these, critical essays, plays and poems. Consult Hammont, *La Vie de Tourguenieff*, 1910; A. Yarmotinsky, *Turgenev*, 1926; E. Garnett, *Turgenev*, 1927.

Turgot, Anne Robert Jacques (1727-81), a Fr. statesman and economist, b. in Paris, where his father occupied in turn various of the highest municipal positions. He was destined for the ecclesiastical profession, but felt that he could not enter this state of life without hypocrisy. He therefore studied law, in which from the beginning he showed remarkable capacity. After holding various minor appointments he was, in 1761, appointed intendant of Limoges, a province

whose prosperity was then at the lowest ebb. On the death of Louis XV., a wider field was opened for his enlarged and beneficent policy, and he was rapidly raised to the position of Controller-General. By a series of enactments, some of which were repealed immediately after his removal from office, he aimed at destroying the servitude of the peasant class and at removing the disabilities under which the townsmen suffered. But all those who had lived by these abuses—nobles, courtiers, financiers, farmers of the revenue—now united in a conspiracy against him which Louis XVI. was too weak to resist. In 1776, having held office for only



A. R. J. TURGOT

twenty months, he was dismissed. For the rest of his life he lived in retirement, devoting himself to physics and mathematics, literature and poetry. He published various works on economics and literature. See Lavergne, *Economistes français au 18^e siècle* (1870), and Lives by Condorcet (1786) and Neymarck (1885).

Turin (It. *Torino*, ancient *Augusta Taurinorum*): (1) A prov. of Piedmont, N.W. Italy, 2116 sq. m. in area. Pop. (1928) 1,128,569. (2) Cap. of above and chief city of Piedmont, at the junction of the Dora Riparia with the Po, in a fertile plain at the foot of the Alps. It contains an ancient castle and several modern palaces, a fifteenth-century cathedral, and the mausoleum (Superga) of the House of Savoy nearby. Its university (founded 1404) ranks next in Italy to those at

Naples and Rome. There are fine museums, picture-galleries, and academies. Among its monuments are the Môle Antonelliana (finished in 1889 as a museum in honour of Victor Emmanuel II.), the Mont Cenis Tunnel monument erected to its engineers, the Crimean monument, and those to Cavour (1873), Amadeus VI., Garibaldi, and Duke Emmanuel Philibert. The chief manufactures are motorcars, steel and iron goods, silk and fabrics of all kinds. Important under Amadeus V. (1418) and the succeeding Dukes of Savoy, it was held by the Fr. from 1506–62, and again in 1640, 1706, and 1798. After Marengo (1800) it was annexed to France, became capital of Sardinia (1814–60), and of all Italy (1860–65). Pop. (1929) 591,316.

Turkestan, a tn. of Russian Central Asia in the Kaizat Aut. S.S.R., 176 m. N. of Tashkend on the Orenburg-Tashkend railway. Has a citadel and the mosque and tomb of Azret. Was formerly a place of pilgrimage. Trades in hides and wool. Pop. 21,786.

Turkestan, means, etymologically, the land of the Turks, but this is no longer a true description, as in Western or Russian T. the Kirghiz and Turkomans make up the greater part of the pop., while the inhabitants of Eastern or Chinese T. are mostly nomadic. Geographically, T. describes those regions of Central Asia which are shut in by Siberia to the N., Mongolia and the wide desert of Gobi to the E., Tibet, India, and Afghanistan to the S., and westward by the Caspian. The N. part of Afghanistan, between the Hindu-Kush and the Russian frontier, is known as Afghan Turkestan.

Russian Turkestan.—Mainly low-lying, it rises in the E. to the Alai and the Trans-Alai, the ramparts of the Pamirs, the Ala-tagh, and the Thian Shan ranges, which completely dwarf the Alps; individual summits in T. rise as much as 23,000 ft. above sea-level. The Amu-Daria (or Oxus) and the Syr-Daria (or Jaxartes) are the chief rivs. and are respectively 1500 and 1350 m. long. The country is interspersed with steppes, deserts, salt marshes, and great lakes like Lake Aral and Lake Balkash, which are fast shrinking in consequence of rapid desiccation. Silk, cotton, grapes, melons, and tobacco are the chief products from the many fertile oases. T. was conquered by Russia in 1866–73, in which latter year the Emir of Bokhara and the Khan of Khiva recognised Russian suzerainty. Beside these two states, there was the governor-generalship of Turkestan further E., subdivided into the provs.

of Ferghana, Syr-Daria, Semirychensk, and Samarkand. Tashkent was the cap., Samarkand and Khotan the chief tns. W. of Khiva and Bokhara lay the Trans-Caspian prov., sometimes included in T. After the revolution, in 1920, the Khan and the Emir were deposed and Khiva and Bokhara set up People's Soviet Republics; the next year the governor-generalship of T. was constituted an Aut. Socialist Soviet Republic. In 1924 it was decided to redistribute, on a national basis, the territories of the three republics, and thus there came into being the new states of Turkmenistan, Uzbekistan, and Tajikistan, inhabited respectively mainly by Turkomans, Uzbeks, and Tajiks. Those parts of T. inhabited mainly by Kirghiz (Kazaks) were added to the already existing republic of Kazakhstan or Kaizakistan; some areas were, however, later separated to form the aut. region of Kara-Kalpakia, S.E. of Lake Aral, and the republic of Kirghizia. See KARA-KALPAKS; KIRGHIZ; TAJIKISTAN, etc. Also A. M. B. Meakin, *In Russian Turkestan*, 1915; Stephen Graham, *Through Russian Central Asia*, 1916; W. Barthold, *The History of Turkestan*, 1922.

Chinese Turkestan.—A prov. of W. China, Eastern T., also called Upper Tartary, or Little Bokhara, is now usually known by the Chinese name of Sin-Kiang. It is a high table-land (2675 to 4600 ft.), lying between Mongolia on the N. and Tibet on the S. with an area of 550,340 sq. m. It embraces the basin of the Tarim, which drains an area of 354,000 sq. m., half of which is barren desert. Encircling the prov. is a mountain girdle, composed of the Thian-shan and Karakoram Mts., the Belur Tagh and the Gobi wastes, which guard it from the outer world. The climate is extremely continental, and blinding sandstorms are continually sweeping over cities and silting up lakes and the beds of streams. Wheat, barley, maize, fruits, and tobacco, etc., are grown in the lowland oases. Higher up are pastures for sheep and horses. Wool, cotton and silk, jade and gold are other products, and the prosperity of the country is increasing. Urumchi, or Tihwafu, is the cap. and the seat of the governor; other important cities are Khotan and Kashgar, famed for their orchards, Yarkand, Ili, and Aksu. Pop. about 2,000,000. See C. P. Skrine, *Chinese Central Asia*, 1926; A. von Le Coq, *Buried Treasure of Chinese Turkestan*, 1928.

Turkey: Geography.—The republic of T. comprises parts of E. Thrace in

Europe, including Constantinople (Istanbul) and Adrianople (some 9000 sq. m. in all), and, in Asia, the whole of Asia Minor from the Egean Sea to the frontiers on the W. of Georgia and Persia and from the Black Sea in the N. to the frontiers of Syria and Iraq in the S. The total area of T., including T.-in-Europe, is estimated at about 294,000 sq. m. T.-in-Asia is practically restricted to Anatolia, the great plateau of Asia Minor (*q.v.*), and the dists. of Kars, Ardahan, and Batum (excluding Batum port). The chief rivs. are the Maritza and Vardar. The former discharges into the Egean, and is navigable as far as Adrianople where it is joined by important affluents, and where, moreover, the highways over the Balkan passes converge. The Bosphorus, which guards the approach to the Black Sea from the Sea of Marmora, and is at the same time the focus of all maritime trade between the Mediterranean and Russia, etc., as well as of the overland routes from Europe into Asia Minor, has fitly been likened to a tortuous riv. valley over whose wooded banks are scattered forts and towers, cities and villages, castles and parks. The southern gate of the Sea of Marmora is the Dardanelles, which gives an opening into the Egean.

Agriculture.—The production of tobacco (some 93,000,000 lb. annually) is the chief item in Turkish agriculture. Cotton and silk are grown in increasing quantities—30,000 and 145 metric tons respectively in 1929, the cotton production being double that of 1928. Cereals, figs, nuts, and varieties of fruits are exported.

Minerals are still undeveloped, yet there is every reason to believe that iron, lead, and other metals exist in plenty. Some chrome ore is annually exported, also copper ore, manganese, zinc and borax, while the total production of coal is under a million and a half tons. There are silver and gold mines.

Industry.—Manufs. are backward and hand-loom cotton weaving is almost the only one of importance, though there are silk factories both in Constantinople and Salonica, and there is still some traffic in shawls, leather, and the world-famous carpets. Industrial machinery is being imported and new sugar factories have been opened. The textile factories have retained most of their pre-war trade. The chief exports are cocoons, mohair, figs, coffee, raw silk, barley, and opium, whilst the imports are sugar, flour, rice, linen, petroleum, coffee, woollen stuffs and cashmere, and machinery. Exports from T. to Great Britain averaged £2,600,000

between 1926-30, being mainly figs, raisins, mohair wool, and carpets. British exports to T. average some £3,000,000, but declined in 1929 and 1930. About one-third of that figure is represented by cotton goods. Imports of American produce into T. average (1926-29) some 4 million dollars and exports of Turkish produce to the U.S.A. 19 million dollars. The Turkish merchant service has (1929) 13,351 vessels, total tonnage 4,508,185, while a flourishing coasting trade is in the hands of a Turkish company. T. is connected with Athens and Bucharest by air.

Internal Communications.—The majority of railway lines are owned by British, Fr. and Belgian companies. The total length of lines is nearly 4000 m. standard gauge. Gov. contracts for a further 500 m. are under consideration. T. has retained the Anatolian and the Bagdad railway systems (outside Iraq), which were planned by the Gers. and left incomplete (*see also* BAGDAD RAILWAY). Road-building has been an essential occupation of recent years. Some 9000 m. of national roads and 22,000 m. of provincial roads have now been constructed. All foreign post offices have been discontinued. The number of Turkish post offices is 2000.

Defence.—Military service is compulsory for all men over the age of twenty-one for eighteen months (infantry) or two years (cavalry and artillery), with a liability for service lasting twenty-five years. Present strength of the army (1929) is 120,000 men, with 20,000 officers. The navy is undergoing an extensive programme of reconstruction. Defence (54,211,501 Turkish £s in 1930-31) is the largest item of national expenditure.

Population.—A general census (the first in Turkish history) was taken on Oct. 20, 1927, and the total pop. was found to be 13,648,270, of which 6,563,879 were men and 7,084,391 women. T. is divided into sixty-three vilayets, while of the tns. the most populous is Constantinople (Istanbul), 690,857. The next largest tns. are Smyrna (Izmir), 153,924; the present cap. Angora (Ankara), 74,553; and Adrianople (Edirne), pop. 34,528.

Constitution and Government.—On Oct. 29, 1923, T. was proclaimed a republic, and the constitution was promulgated on April 20, 1924. By the Fundamental Law of Jan. 20, 1921, the executive and legislative powers passed to the Grand National Assembly, a single chamber, the members of which were originally elected for two years and later by the constitution for four years. Army officers may not sit in the Assembly.

The President, who may not vote, is elected every four years after the calling of a new National Assembly. The Assembly delegates its executive powers to the President and to 'a cabinet chosen by his appointee, the President of the Cabinet.' Local gov. is centralised. Each vilayet has its own council, presided over by a representative of the gov. At election for the Assembly every citizen over eighteen years of age is entitled to vote, and in 1931 this privilege was extended to include women.

Justice.—The old religious courts and the former Courts of Appeal were abolished, and much of the Ottoman civil code discarded. In 1926 a new penal code was established, adapted from the Italian Code, and new civil and commercial codes, borrowed from Switzerland and Germany respectively. There are now some 600 tribunals, above which there is a Supreme Court at Angora of thirty-two judges, subdivided into specialist bodies. General judicial supervision is the work of inspectors-general, six in number. For the training of jurists a Faculty of Law was opened at Angora.

Education.—On March 3, 1924, the Moslem religious schools were abolished and replaced by state schools in which, or in community schools or private schools, primary education is compulsory. There are over 6000 primary schools and over 100 secondary schools. The University of Constantinople was founded in 1901 and is for men and women. By a law of Jan. 1, 1929, everyone between the ages of sixteen and forty is obliged to attend school to learn the Latin alphabet, the Arabic letters having been forbidden.

Religion.—The religion of the Turks is almost universally Mohammedanism, which, however, ceased to be the state religion from April 10, 1928. By the October census of 1927 Moslems number 13,269,606. There are some 110,000 belonging to the Gk. Church, 77,000 Armenian Christians, and 90,000 Jews.

History.—It was by military conquests that the Ottomans secured a European foothold, and it was thus that the empire reached such splendid dimensions in the sixteenth century. But in time success disarmed them, and the dominions of the Sublime Porte began to crumble away, so that long even before the Great War there seemed every likelihood that the Turk would be driven across the Bosphorus to the Asiatic countries whence he came. The result of the Balkan War of 1912 and of the Great War, so far as T. was concerned, was almost wholly to confirm this expectation.

The T. showed himself incapable of coping with the task upon which, in the fifteenth century, he embarked. He came with the gift of Islamism, and when this was rejected he had nothing else to offer. His highest merits, namely, his valour and religious fervour, have been the instruments of his undoing. For his appeal to the sword, whenever his will was questioned, created a barrier to all friendly intercourse between himself and the conquered races, whilst his fanaticism compelled him to treat all save his brother Mussulmans as inferior beings who in refusing the Koran had laid themselves open to contempt. In the seventh century the Turks first emerge from other tribes of the Turanian stock, and their story opens with the significant fact of their conversion to the Mohammedan faith. Little of consequence is told about them after this until Toghrul Beg, the leader of a branch of Tatar invaders, who are always known as the Seljukian Turks, captured Bagdad in 1058. This led directly to the foundation of imperial power by the Turks in Asia, a power which subsisted almost unimpaired up to the Great War. Cairo and Jerusalem fell before the successors of Toghrul Beg, and soon the Turks were in possession of Asia Minor and the greater part of Syria. But the Seljukians could not maintain the integrity of their empire against the assaults of the Crusaders and their place was taken by the stronger and nearly related tribe of Ottomans. These latter, who like the Seljukians took their name from a warrior chief (Othman), overran all the Asiatic provs. that had once been within the confines of the Rom. empire, and made some headway in Europe. About 1353, when an emperor of the Palaiologoi dynasty was still weakly upholding the tottering fabric of the Byzantine empire, there was civil strife in the cap. and one faction rashly called in the Tatars to their aid. The invitation was eagerly accepted, and the Ottomans made the appeal for aid a pretext for prosecuting their own conquests and for winning new territory for their own expansion. Adrianople submitted to their sultan, Amurath I. (1360-89), in 1361, and soon the proud city of Constantinople and a few outlying and scattered dependencies were all that were left of the once mighty empire of Constantine. It was Amurath who remodelled the Janissaries and first used these troops with such remarkable success. This body of soldiers was at first composed of Christian captives, and when their number was no longer sufficient to recruit the

force the sultan proceeded to exact as a toll from the Christians every fifth male child. From this tributary band the bravest were trained for a soldier's career, and when they grew up were drafted into the Janissaries. To return to the days of Amurath: when he died he was succeeded by his son, Bajazet I. (1389-1403), who also proved a great conqueror. In 1396 he gained a signal victory at Nicopolis (in Bulgaria) over the allied armies of Germany, Hungary and France, and 'the flower of the Christian chivalry of Europe' was crushed by the Mohammedans. The victory alarmed Western Europe, and Constantinople seemed doomed. Indeed Bajazet had actually begun the siege of that city when the victories of Tamerlane (Timour) forced him to cross the straits in haste to save his Asiatic dominions from this new aggressor. The issue was decided on the field of Angora (1402). Bajazet suffered an ignominious defeat and became the captive and sport of his insolent rival till death released him in 1405. But the advent of Tamerlane only deferred and could not stave off the downfall of Byzantium. In 1421 the Ottomans made an unsuccessful assault, and finally Mohammed II. encamped outside the city in 1453 with an army of 200,000. The resistance was weak, and the Turks were soon within the walls. Constantine XI., the last Byzantine emperor, died sword in hand. Greece was subjugated by the Ottomans between 1456 and 1460, just as Serbia had been subjugated in 1389 after the Battle of Kossovo, and Bulgaria by Bajazet in 1396, and just as Macedonia was annexed in 1430. Thus the Ottoman swallowed up the Eastern empire, but it was not yet swollen to its full. Mohammed II. succeeded in penetrating into Italy, and for one year (1480) the city of Otranto (in Calabria) was under Ottoman sway. Selim the Inflexible (1512-20) overran the islands of the Archipelago, took possession of the whole of Syria (1515), obliged the Abbasside Caliph of Cairo to surrender his jurisdiction, and finally annexed Egypt after defeating the Mamelukes (1516). Probably the empire attained its period of greatest splendour during the reign of Solymán the Magnificent (1520-66). This warrior-king captured Belgrade in 1521, and in the following year expelled the Knights of St. John from Rhodes. In 1526 he inflicted an overwhelming defeat on the Hungarians, whose king, Lewis II., died on the field of battle, and in 1529, after humiliating Vienna by a protracted blockade, he marched with a huge army against Germany. That

country was then in the throes of religious dissensions, and it was only the gravity of the crisis which induced Catholics and Protestants to unite, and so provided the Emperor Charles V. with a formidable army, before which Solymán retired. Still, for the time being a great part of Hungary became Turkish domain, and at Buda a Turkish 'Pasha' was actually installed. Further, the authority of the sultan was almost supreme in the Mediterranean, and it was under his protection that the pirates of Algiers terrorised merchants and sailors and kidnapped Christians to sell them into bondage. Charles's brilliant seizure of Tunis (1535) was a serious check to Ottoman influence in the S. After the death of Solymán, who was the last of the great soldier-sultans to leave the empire greater than he found it, there were only two fresh acquisitions of importance, namely, Cyprus, which was wrested from Venice in 1571, and Crete, which finally passed into Turkish hands in 1669 after Candia, the cap., had withstood a siege for over twenty years. From the last quarter of the sixteenth century dates the gradual but steady decline of the sultan's supremacy. Already, however, the commonwealth of Venice on the Adriatic and northward the kingdoms of Hungary and Poland had proved redoubtable buffers between Christendom in the W. and the lands of Islam in the E. As early as 1456 John Huniades of Poland had repulsed the Turks from Belgrade, but the first serious disaster which overtook them was the annihilation of their fleet in the Gulf of Lepanto (1571) by the combined squadrons of Philip II. of Spain and the Venetians. This victory ended Ottoman encroachments in the Mediterranean. Most of the Turkish wars continued to be waged with Hungary and Venice. The Emperor Leopold of Austria incurred the hatred of his Protestant subjects in the former kingdom by his persecutions, with the result that they appealed to the Porte for aid. The latter readily complied, and in 1683 the Turks were once more at the gates of Vienna. This time the cap. was rescued by the opportune arrival of Sobieski, king of Poland, and the Duke of Lorraine. The following year the Venetians cast in their fortunes with Leopold and Sobieski, with the result that their general Morosini laid siege to Athens and won the entire Peloponnesus for his republic. The Peace of Carlowitz, which concluded this war (1699), confirmed this conquest to the Venetians, and secured Hungary for the Austrians. Herzegovina was ceded

by Leopold to T. A second struggle between the House of Hapsburg and the Porte was terminated by the Peace of Passarowitz (1718), when the former received Belgrade and part of Bosnia and Wallachia. T. had won back the Peloponnesus in 1716, and Belgrade was recovered in 1739. By this time Russia was pressing hard upon the north-eastern frontiers of the empire. At first T. more than held her own, but when Catherine assumed the reins of power, fortune veered to the opposite side. There was a natural bond of union between the Slavs of Russia and those of Bulgaria and Serbia, whilst Catherine and her successors taught the Christian subjects of the Porte to regard Russia as their champion and to revive the Eastern Church. The long series of Russo-Turkish wars began in 1730. By the Peace of Kainardji (1774) the sultan relinquished his suzerainty over the Tartar Khans of the Crimea and Russia secured the approach to the Black Sea. The Treaty of Jassy (1792), which closed a second war, was equally favourable to Catherine, for the northern boundary of the Ottoman empire was pushed back to the Dniester. In 1807, the year of the Treaty of Bucharest, this boundary was put still farther S., as far as the Pruth. Twenty-one years later Nicholas I. of Russia declared a fourth war on his now inveterate foe. Already his forces had crossed the Balkans and reached Adrianople, and would in all likelihood have closed in on Constantinople had not England and Austria adopted the rôle of peace-maker. This campaign was concluded by the Peace of Adrianople (1830), the chief provision of which was the recognition by the Porte of the complete independence of Greece. Nicholas had timed his invasion so as to profit from the sultan's embarrassment consequent on the Grecian insurrection. For the Gks. had risen in revolt, but they would have succumbed had not England, France, and Russia come to their assistance and vanquished the Ottoman fleet at the Battle of Navarino (1827). The Crimean War of 1853-56 grew out of Czar Nicholas's ambition to parcel out the Turkish empire, and in so doing to secure the major share, the Balkan peninsula, himself. But the sultan forestalled Nicholas's intention to pose as champion of his 10,000,000 Christians by issuing a firman, whereby he himself guaranteed to them the free exercise of their religion. Moreover, England and France, glad to damage Russian prestige, proffered their assistance. The will of the allies was recognised in

the Peace of Paris (1556); the integrity of the sultan's empire was maintained, and the Christian subjects were put under the aegis of the Great Powers instead of that of Russia; Nicholas failed to touch Constantinople, 'the key to the Russian house,' and the fate of the 'sick man' (Turkey) was designedly left a moot question. The whole nineteenth century is blackened for T. by revolts. In 1798 Napoleon had easily overcome the Mamelukes of Egypt, who were nominal vassals of T., but it was not till 1879, the year of the establishment of the dual control of France and England, that Turkish overlordship in Egypt finally came to an end. The movements for independence in Italy and Germany no doubt infected the Balkan states with the same longing for a national life. During the Gk. war of liberation, 40,000 inhabitants were massacred in Chios (Scio), and in 1860 3000 Christians were put to death at Damascus. Barbarities were practised in Bulgaria during the rising of Herzegovina, Bosnia, and the other Balkan states (1876), whilst Europe stood aghast at the atrocities perpetrated against the Armenians in 1895 and repeated in recent years (see ARMENIA.—*Massacres*; ARMENIAN ATROCITIES). In 1877 Russia once more adopted the leadership of a Pan-Slavonic movement, and came forward as the defender of the Christians. Once more foreign interference alone stayed the Russian advance on the cap., and the short campaign was brought to an end by the famous Berlin Treaty (1878), which was drawn up by the Great Powers acting in concert. By this agreement the independence of Bulgaria, Serbia, Rumania, and Montenegro was formally acknowledged. Bosnia and Herzegovina were occupied by Austria, and Cyprus handed over to British control. Eastern Rumelia, whilst being retained by the sultan, was given an 'administrative autonomy' under a Christian Pasha. Serbia, it should be noted, had been more or less free since 1807, and the Montenegrins had been virtually free from the Ottoman yoke since 1696. Moldavia, with Jassy, and Wallachia, with Bucharest as its cap., had coalesced into the single kingdom of Rumania in 1861. Cyprus demanded union with Greece as early as 1895; and in 1903 Crete, which was evacuated by Turkish troops in 1898, declared its affiliation with the same state.

There remains only to refer to the movement of the Turks towards reform and the adoption of Western gov. and practice (see MUSTAPHA

KEMAL). As long ago as 1839 a body of progressive measures, entitled the 'Hatt-i-Sherif,' was promulgated, and Christians were at last admitted to office in 1849. Riots in the cap. extorted from the sultan another and enlightened political constitution in 1876, and Midhat Pasha (*d.* 1884) devoted a strenuous life to the furtherance of liberal ideas and progress. But the new constitution remained in abeyance until the Liberal Party rose in a body twenty years after (1896) and demanded its restoration. In April 1897 war broke out between T. and Greece, but in a few months the latter was worsted, and only saved by the interference of the Great Powers, which led to peace being signed at Constantinople in December of the same year. Later, the growing abuses of the gov. resulted in the formation of what is known as the 'Young Turk' Party, which included in its ranks some of the most influential men in T. The movement was partly suppressed in 1901. Seven years later the 'Young Turks' again agitated with more effect, as the sultan opened a new parliament, with Ahmed Riza, one of the leaders of the movement, as president. In 1909 the sultan was deposed, and his brother was called to the throne as Mohammed V. There had previously been trouble with France over the hinterland of Tripoli and with Bulgaria in regard to the 'liberation' of Macedonia. In 1908 Bosnia and Herzegovina were annexed by Austria, and in 1909 Bulgaria's claim to independence was accepted. In 1911 Italy forcibly seized Tripoli, and after a year's desultory fighting T. was obliged to sue for peace, as fresh trouble was brewing nearer home (see BALKAN WARS). The first Turkish parliament was dissolved in 1912, and a fresh cabinet was formed the same year. The Treaty of London was signed on May 30, 1913, which left T. with only a small strip of territory in Europe, extending from Midia on the Black Sea to a point near Central Ibrige on the Aegean. T., however, took advantage of the Second Balkan War to take back Adrianople, which was occupied by Enver Bey on July 20, and on Sept. 29, after the war, a separate treaty between T. and Bulgaria fixed the frontier of T. in Europe at the Maritza R. In 1914 Enver Bey, now Enver Pasha (*q.v.*), became Minister of War, and he was under the influence of Germany, represented in T. by a military commission under General Liman von Sanders (*q.v.*), who was appointed commander-in-chief of the Turkish army. Moreover, on Aug. 27 the Ger. cruisers, *Goeben* and *Breslau* (see

GOEBEN AND BRESLAU), became units in the Turkish navy, although remaining manned by Ger. crews. On the other hand two battleships which were building in England for T. were taken over by the British Gov., and this aroused deep resentment in T. On Sept. 8, T. declared the capitulations (q.v.) to be abolished, and following Turkish naval attacks in the Black Sea, Russia and then England and France declared war on T. Enver Pasha became a virtual dictator, but at the outset Turkish troops met with disaster in the Caucasus (see CAUCASUS.—*The Great War*). In the Allied attempts, however, to force the Dardanelles and take Constantinople the Turks held their own and saved the cap. (see DARDANELLES). The Turks were also fighting on the Mesopotamian front and were at first successful against the British army beleaguered in Kut al Amara (see MESOPOTAMIA.—*Great War Campaign in Mesopotamia*; KUT AL AMARA). Ger. influence was able to bring about an entente between T. and Bulgaria, but in Aug. 21, 1915, Italy declared war on T. In 1916 the situation did not materially change, although T. was embarrassed by a revolt of the Arabs, who, led by Hussein (see HUSSEIN IBN 'ALI), declared the Shereefate of Mecca independent. In 1917 Sir Stanley Maude conducted brilliant operations on the Tigris, Bagdad being taken on March 11. In Feb. a change of cabinet brought in Talaat Bey as Grand Vizier, Enver Pasha remaining War Minister. When the U.S.A. entered the War, relations with T. were severed, but there was no declaration of war. With the defeat of Bulgaria and in spite of T.'s advantageous peace with Russia at Brest-Litovsk (q.v.) in 1918 T. had no hope of victory. On July 3, 1918, Mohammed V. died and was succeeded by his brother, Prince Vahided-Din, who became Mohammed VI. In Oct., Enver resigned and Talaat was succeeded as Grand Vizier by Izzet Pasha. An armistice with the Allies was signed with T. on Oct. 30, 1918, at Mudros, and this marked the lowest ebb of Ottoman fortunes. The 'Young Turk' Party (the Committee of Union and Progress, as it was called) had abandoned Constantinople, where in 1919 a feeble Liberal Entente Gov. was in power with Damad Ferid Pasha as Grand Vizier. A movement, however, towards the regeneration of T. was begun in Anatolia, where Mustapha Kemal (q.v.) and his right-hand man, Ran Bey, a former naval commander, convoked a Turkish Nationalist Congress at Erzerum on July 23, 1919. 'The Anatolian and Rumelian

League for the Defence of National Rights,' or simply the 'National Organisation,' resulted. On Sept. 4, 1919, a second congress was called at Sivas, and a party programme was drawn up. The Nationalist Party under Kemal, being regarded as rebels, chose Angora, an impregnable tn., as its headquarters, while a Nationalistic army was also formed out of local militias, with Qara Bekis Kiazim Pasha and Ali Fuad Pasha as commanders-in-chief of E. and W. Anatolia respectively. On Oct. 5, 1919, Damad Ferid fell from power in Constantinople. A new gov. was formed under Ali Riga Bey and at the ensuing election the Nationalist Party found itself legitimised by its strong representation. Moreover, in Jan. 1920 the Turkish National Assembly accepted the 'National Pact'—a declaration of Turkish independence—promulgated from Angora. Two months later, however, the parliament was dispersed by Allied forces under General Milne; martial law was proclaimed; and Damad Ferid Pasha reinstated. The old parliament, now outlawed, re-assembled at Angora, strongly 'Nationalist' in sympathy. On Jan. 20, 1921, the Law of Fundamental Organisation was drawn up at Angora, placing the sovereign power in the hands of the Turkish people. Meanwhile the Nationalist Party was further strengthened by Turkish protests against the Gk. occupation of parts of Anatolia. The situation rapidly developed into war, of which the first phase in 1920 was favourable to the Gks., but in 1921 and 1922 the Gk. offensives were terminated by Turkish victories of which the last was complete (see GRAECO-TURKISH WAR). The Turkish army was at the beginning of the war improperly organised, but the new gov. operated from Angora, which was very strongly fortified. On May 15, 1921, the Allies had declared their neutrality and had set off territory either side of the Bosphorus and the Dardanelles as a neutral zone. Allied solidarity, however, was shaken by a separate Franco-Turkish Treaty, known as the Franklin-Bouillon Pact, by which Fr. troops were withdrawn from Cilicia and a boundary line, advantageous to T., was drawn up between T. and Syria. Italy was also favourable to the Kemalists and withdrew its forces from Adalia. In March 1923 Allied peace terms were rejected by T. and further hostilities were occasioned by the Gk. attempts to make an autonomous state of 'Ionia' out of the Smyrna area. The Gks., weakened by political

changes and the fall of Venizelos (*q.v.*), were defeated at Ushak and on Sept. 9 Smyrna was taken by the Turks. The continuance of the Turkish pursuit of the Gks. into Thrace was prevented by the British troops, stationed at Chanak, but Lloyd George's policy was no longer supported by France, and the Fr. troops retired to Gallipoli. General Harington (*q.v.*), the Allied commander-in-chief, succeeded in avoiding a conflict and negotiated an armistice which was finally signed at Mudania on Oct. 11, 1922. It was a surrender of the former Allied policy and occasioned the resignation of Lloyd George. Gk. aspirations in Asia Minor were ended and all Thrace as far as the Maritsa R. was restored to T. A peace conference was opened at Lausanne on Nov. 20. T. was represented by Ismet Pasha (*q.v.*), who was then Foreign Minister of the Angora Gov. Negotiations broke down after three months, during which time England was represented by Lord Curzon. They were resumed in April 1923, England being represented by Sir Horace Rumbold, and, all Turkish demands being acceded to owing to the divided policies of France and England, the treaty of peace was signed on July 24, 1923, and ratified by Great Britain April 13, 1924 (see LAUSANNE, TREATY OF). The treaty agreeably settled T.'s international relations for some time following, territorial differences with Soviet Russia, and the establishment of an overland route between Moscow and Angora—made possible by the creation of the Soviet Republics of Armenia, Erivan, and Georgia—having been previously arranged by a treaty of March 16, 1921. By this treaty the dists. of Kars, Ardahan, and Batum (excepting Batum port itself) were assigned to T., and in the ensuing diplomatic struggles with Great Britain and the actual war with Greece, T. could count on the tacit support of Russia. By the Lausanne Treaty foreign capitulations (*q.v.*) and the 'millet system' were abolished—the latter being a system of local autonomy, on a religious basis, which had grown up within the disparate Ottoman empire. The capitulations had been abolished by T. at the beginning, and restored by the Allies at the end, of the Great War. In July 1922, Rauf Bey, who with Kemal had been mainly instrumental in causing the Nationalist Revolution, became Prime Minister. On Nov. 1, 1922, the sultanate, which had become unpopular since the sultan had submitted to the Allied occupation of Constantinople, was declared abol-

ished. The sultan-caliph, Mohammed VI.—Vahid-ed-Din Efendi—fled Constantinople on Nov. 17 with his eldest son, Prince Ertoghul Efendi, being taken on board a British battleship. The National Assembly then elected the cousin of the deposed sultan, Abdul Mejid Efendi, to be plain caliph, the Commander of the Faithful, but with no temporal powers. This 'spiritual' caliphate (see CALIPH, CALIPHAT) was finally abolished two years later by decree on March 3, 1924. Meanwhile, on Oct. 2, 1923, the foreign occupation of Constantinople terminated, and on Oct. 29 T. was declared a republic. Mustapha Kemal, the Ghazi, or Conqueror of Infidels, was elected President. The republic took the form of a powerful oligarchy, led by a dictator and depending on a censorship of all opposition utterances, especially in the Press. An opposition party, the Progressive, did, however, come into existence and was joined by Rauf Bey. He was succeeded as Prime Minister by Fethi Bey, who in 1925 was replaced by Ismet Pasha, owing to the need of a strong gov. to quell the Kurdish Rebellion which broke out in Feb. This rebellion aggravated the Mosul Question, which arose out of the conference to determine the boundary between T. and Iraq. Eventually, on June 6, 1926, almost the whole vilayet of Mosul was given by treaty to Iraq (see MOSUL). In March 1927 T. signed a commercial treaty with Russia, but later this was offset by frontier trouble with another neighbour—Persia. The general election of Oct. returned the Kemalists to power, and Mustapha Kemal was re-elected President by the new Assembly, which met in Nov. The Persian trouble was settled by a pact, June 15, 1928, and a Turco-Italian Pact was ratified in Nov. In 1929 a commercial treaty was negotiated with Great Britain, and one was finally ratified on June 1, 1930. The financial crisis of that year brought back to domestic politics Fethi Bey, who formed a Free Republican Party, recognised by Kemal as the official opposition. The work of 'westernising' T. being almost completed, the Ghazi relaxed his methods of dictatorial reform, but the position of the man who has created the New T. remains unassailable.

Literature.—Like the early Latin poetry, the literature of the Osmanlis is almost wholly one of imitation, and just as Terence and Plautus sought inspiration from the old Gk. writers of comedy, so the primitive Ottoman poets drank most deeply from the well of Persian verse. From Persian

poets they borrowed their forms, their style, and their theme. Ahmed Pasha (d. 1496), a vizier of Mohammed II, freely plagiarised the popular 'ghazels' of the Persian Nev'î (d. 1500). Fuzuli of Bagdad (d. 1555), one of the first of Ottoman poets, is admired above all for the tender beauty of his *Divân* or collection of ghazels, and it was this vehicle (the ghazel) which the versatile Nabi (d. 1712) chose when he wished to reproduce the didactic and philosophical strain of the Persian Sâib (d. 1677). The brilliant panegyrics of Nef'î of Erzerum (d. 1634), whose light in the history of Turkish poetry shines as brightly as that of Fuzuli, are expressed in the form of the 'kasida' or lyric of Arabia. Both the ghazel and the kasida were adopted from Persian literature. The former, often described as the sonnet of the East, was a mono-rhythmic poem of some ten couplets, in which the rhyme-sound of the first couplet reappears in each alternate line. The *Khusrev and Shirin* of Sheykhî of Kermiyan (d. c. 1440) was a romance in verse, dealing with an old Persian story and written like the elaborate and prolix Iranian epics, from which it was copied, in the conventional 'mesnevi' or rhymed couplet. In style again Ottoman writings reveal the merits and demerits of their Persian prototypes. They are mannered and insincere, and tainted with that artificiality which invariably infects a court literature. Far-fetched conceits, extravagant word-painting, and a stereotyped phraseology continually obscure what are often fine thoughts.

The same thoughts are apparent in the prose history of Sa'd-ud-din (d. 1599), entitled the *Crown of Chronicles* (*Tâ-ut-Tevârikh*), where the excess of rhetoric palls and where that favourite embellishment known as the 'sej,' which consists in rhyming the last words of successive clauses, produces a jingle which falls unpleasantly on Western ears. Finally, the imitation of Persian models is equally apparent in subject-matter. Ottoman poets, like their masters, never sang the song of battle, though they belonged to a race pre-eminently warlike, but devoted themselves rather to the composition of countless love-lyrics and odes to spring, as well as to the other joys of nature. There is a light-hearted spontaneity in the ghazels and kasidas of Nedim (d. 1730), which lifts him on to a plane of conspicuous originality, though his elegant diction and grace are clearly Iranian in origin; but the *Husn-u-Ashk* (*Beauty and Love*) of Sheykh Ghâlib (d. 1798), though it is justly esteemed as one of the finest allegories

in the language, bears every trace of the contemporary revival of Persian domination. Space allows only of the mention of two other writers, and they are Shinasi Efendi (d. 1871), Hamid Bey, a leading playwright, and Mohammed Emin, a sacred poet. In the last century a revolution was effected in literature as in the political world. Western and especially Fr. modes of thought filtered into the cap., and the new school of writers have gone back to a simplicity and naturalness of style more suited to their modern outlook.

Consult: Description: E. de Lavelaye, *La Péninsule des Balkans* (Brussels), 1886; A. Boué, *Die Europäische Türkei* (Vienna), 1889; Sir C. Elliott, *Turkey in Europe* (London), 1907; H. C. Lukach, *The Fringe of the East*, 1913. History: J. von Hammer Purgstall, *Geschichte des Osmanischen Reiches*, 10 vols. (Vienna), 1827-35; J. W. Zinkeisen, *Geschichte des Osmanischen Reiches in Europa*, 7 vols. (Hamburg and Gotha), 1840-63; E. A. Freeman, *Ottoman Power in Europe* (London), 1877; Sir E. S. Creasy, *History of Ottoman Turks* (London), 1878; Stanley Lane-Poole, *Turkey* (London), 1888; Ali Haydar Midhat, *Life of Midhat Pasha* (London), 1903; T. Comyn-Platt, *The Turk in the Balkans* (London), 1906; W. S. Monro, *Turkey and the Turks* (Boston, Mass.), 1907; Sir E. Pears, *Turkey and its People* (London), 1911; E. F. Knight, *The Awakening of Turkey*, 1909; H. A. Gibbons, *The Foundation of the Ottoman Empire*, 1916; W. Miller, *The Ottoman Empire and its Successors*, 1923; Clair Price, *The Rebirth of Turkey*, 1923; Sir T. W. Arnold, *The Caliphate*, 1924; E. G. Mears, *Modern Turkey*, 1925; A. J. Toynbee and K. P. Kirkwood, *Turkey*, 1926; and *Turkey in Asia and Turkey in Europe* (Peace Handbooks, pub. by H.M. Stationery Office, 1920). Literature: E. J. W. Gibb, *History of Ottoman Poetry*, 6 vols., 1909.

Turkey (*Meleagris*), the name for two American species, the largest of the game birds, once believed to have come from Turkey. *M. gallinavo*, the origin of the domesticated varieties, formerly occurred throughout the N. American continent, and was abundant in the U.S.A., in parts of which it is still hunted with greyhounds. The wild birds are both larger and more ornate than domesticated Ts., which, however, have been much improved by introductions of wild blood from time to time in recent years. The largest of the domesticated varieties is the American mammoth bronze, the plumage of which is a beautiful dark bronze with a red

metallic lustre. Among other varieties are the white, buff, slate and black. *M. ocellata*, the other species, occurs in Honduras, and possesses plumage of great brilliancy with ocellated or eyed tail feathers.

Turkey-buzzard, see VULTURE.

Turkey-red, see DYES AND DYEING—*Anthracene-derived dyes*.

Turkistan, see TURKESTAN.

Turkomans, or Turkmenians, a branch of the Turki race, inhabiting W. Turkestan and N. Persia. They are chiefly nomad shepherds and are all Mohammedans, mainly of the Sunnite sect. They appear to be an offshoot of the Uzbeks, who reached the Caspian in the fourteenth century, and several dynasties in Asia Minor, Persia, Syria, and Egypt sprang from them. See Baker, *Clouds in the East*, 1886; Vamberg, *Travels in Central Asia*, 1863.

Turks. The race of people who inhabit an area more extensive than the geographical limits of Turkey, the country. The region occupied by the Turkish people extends from the R. Lena in Siberia to the Danube in Europe and from the Crimea to Kerman and India, including the Arabo-Caspian basin of Turkestan (Land of the Turk). Ethnologically the Turkish race eludes classification, but it may be stated with reasonable authority that the Turkish peoples include the following groups. (1) The Osmanlis (*q.v.*), the people of the present Turkish Republic, who include descendants of Turkoman tribes driven into Asia Minor during the eleventh century, the Tatars of the Dobrudja, the Kizil-bashis of Tokat and Angora, Turkoman tribes of Cilicia, principally nomads who move from the hills in winter to the plains. (2) Turkish nomads of Persia, called Illyats, who are subdivided into the Kajars of Transcaucasia, the Aushars of Azerbaijan, the Kara Koyun-lu of Khoi, all of them Iranian-Turks. Many of these tribes are mentioned by Matthew Arnold in *Sohrab and Rustum*. (3) The Ts. of Siberia and Russia, called Tartars or Tatars. (4) The Uzbeks of Central Asia, an industrious and highly civilised race, maintaining themselves by agricultural pursuits. Together with the Osmanlis they possess a separate written language and literature. (5) The Turkomans of the Eastern Caucasian steppes, who include Imrailis, Yomuts, Goklen, Tekkes, Sakars, Sariks, Salors, Ersaris, and Ali-elis. They are principally nomads and up to 1880 terrorised the surrounding country by their predatory habits.

The Kirghiz (*q.v.*) have preserved, more than any other tribe of Turkish

origin, the anct. racial characteristics of the Ts., with whom there is a marked affinity with Mongolian types just as there is in language and literature. Indeed, what is known to-day of the Turki race is due more to linguistic evidence than to that of ethnology, which remains obscure.

A new conception of the origin of the T. is based upon historical philosophy. It appears in a volume adopted in Turkish schools during 1931 and claims that during the glacial period Turkish ancestors were driven by climatic changes from central Asia to the W. of Europe, there to found various centres of civilisation under such names as Sumerians, Hittites, Lydians, Phrygians, Mycenæans, Cretans, Etruscans, Ligurians, Iberians, and even Celts. The postulation has not to date received the support of authorities in Europe.

Turk's Islands, see CAICOS, CAYOS, OR THE KEYS.

Turkmenistan or Turkmen Republic (T.S.S.R.). A constituent republic of the Soviet Union. It was formed in 1924 and embraces what was formerly the Trans-Caspian region of Turkestan, together with the Charjui vilayet of Bokhara and a small part of Kbiya. It is bounded on the N. by Kazakhstan (*q.v.*), S. by Persia and Afghanistan, E. by Uzbekistan (*q.v.*) and W. by the Caspian Sea. Area, 190,000 sq. m.: pop. (1926) 1,030,545, most of whom are Mohammedan Turkomans, and the remainder Mohammedan Uzbeks. Agriculture is the chief occupation, the principal products being cotton (largely aided by irrigation), wool, and Astrakhan fur. Horse-breeding is also carried on. Minerals include petroleum, salt and sulphur. The seat of gov. is at Poltarask (formerly Askabad); other tns. Merv, Karichi, and Krasnovodsk, a port on the Caspian and a railway terminus on the Trans-Caspian line. The Turkomans kept to their tribal organisation, until the Russian Revolution, but the new regime will eventually break down the old traditions. Historically the Turkomans comprised various warlike tribes who came under Russian rule in 1883 after Merv was conquered. The Turkoman Soviet Republic entered the Soviet Union in 1925.

Turmeric (*Curcuma longa*), a plant with long leaves and a spike of pale cream flowers, a native of Ceylon, and extensively cultivated in India for its rhizomes, which when dried and ground yield a yellow dye. It is also used as an ingredient in curries, and has various uses in Hindu medicine. T. paper is an unsized paper dipped

in an alcoholic solution of T., and is used as a test for alkalis, with which it gives a brown colour turning violet on drying.

Turnbull's Blue, a blue pigment which is precipitated by the action of potassium ferricyanide on a ferrous salt. Its composition is identical with that of insoluble Prussian blue, viz. ferric ferrocyanide,

$\text{Fe}_4[\text{Fe}(\text{CN})_6]_3 \cdot 10\text{H}_2\text{O}$, which is formed on the addition of a ferric salt to a ferrocyanide.

Turnebus, Adrien (1512-65), a Fr. classical scholar, b. at Les Andelys, Normandy. He studied at Paris, and in 1547 became professor of Gk. and Latin there. He enjoyed a great reputation, Montaigne being amongst his friends. He wrote theological and critical treatises, and translated the Gk. and Latin authors. See *In Turnebi Obitu Nenia* (1651), by Passeray.

Turner, Frederick Jackson, American historian; b. Nov. 14, 1861, at Portage, Wisconsin. Graduated, University of Wisconsin, 1884. Studied further, Johns Hopkins University. Professor of: American History, University of Wisconsin, 1892-1910; History, Harvard University, 1910-24. President, American Historical Association, 1910-11. Research associate, Henry E. Huntington Library, California, 1927-30. Publications: *Character and Influence of the Indian Trade in Wisconsin*, 1890; *Policy of France towards the Mississippi Valley in the Period of Washington and Adams*, 1906; *Rise of the New West*, 1906; *Reuben Gold Thwaites*, 1914; *Frontier in American History*, 1920.

Turner, Joseph Mallord William (1775-1851), an Eng. landscape painter. The son of a barber, he was b. in London, and in 1789 he entered the Royal Academy School, where he became intimate with Girtin. In 1798 T. exhibited several pictures at the Royal Academy, and four years later he was made an academician. In 1807 he began the publication of his *Liber Studiorum*, this consisting of a series of Eng. landscapes, many of them engraved by the master himself. In 1828 he travelled in France and Italy, and in 1831 he visited Scotland, having been asked to illustrate a new edition of Sir Walter Scott's poems. The following year he lived at Venice, and in 1836 he went a second time to France; but the closing years of his life were spent mainly in London, and he d. there. He was buried in the crypt of St. Paul's Cathedral, and, in accordance with his will, the National Gallery acquired a large array of his oil-paintings and over a thousand of his

sketches. The Municipal Museum, Glasgow, also contains a number of his works, and there is a fine collection of his water-colours in the National Gallery of Scotland. T. possessed pre-eminently the gift of capturing and rendering transitory effects of light, and his triumph herein proved a vast inspiration to the Barbizon school, and afterwards to the impressionists. The most important study of his art is that embodied in Ruskin's *Modern Painters*, but the reader should likewise consult C. F. Bell, *The Exhibited Works of Turner*; W. G. Rawlinson, *The Engraved Work of Turner*, 1913; Walter Bayes, *Turner: A Speculative Portrait*, 1931.

Turnip, or *Brassica rapa*, a biennial cruciferous plant grown for its thick fleshy root both as a garden and as a farm crop. Ts. are classified according to their shapes, Long, Tankard or Spindle, Round or Globe, and Flat. Another classification is according to the colour of the flesh. White-fleshed varieties are of rapid growth and produce much bulk in a short time, but their feeding value is low and they are liable to be injured by frost. The yellow-fleshed varieties are of slower growth, but are of superior feeding value and keep better during winter. They are probably hybrids between the T. and the Swede (*Brassica rutabaga*), which is distinguished by its neck or collar.

Turnpike Roads, see TOLLS.

Turnstone, or *Streptopelia interpres*, a shore bird allied to the plovers and so called from its habit of turning over stones and shells on the seashore in the search for marine insects and small crustacea. It is widely distributed, but breeds chiefly on Scandinavian coasts, and only visits Britain in the winter. It is about 9 in. long. The upper parts are chestnut with black spots, and the lower parts white, except on the breast.

Turnus, the son of Daunus and Venilia, and King of the Rutulians when Æneas reached Italy. He was stirred up by Hera's commands to oppose Æneas, and appears in Virgil's *Æneid* as a brave warrior. He was slain by Æneas. Livy and Dionysius also mention him.

Turnu-Severin, the cap. of the dept. of Mehedinți, Rumania, on the l. b. of the Danube. The old tn. was destroyed in the fifteenth century, and the present one was founded 1835-41. Trades in live stock, cereals, and petroleum, and has shipyards and repair shops. It was captured by the Austrians in 1916. Pop. 30,000.

Turpentine is obtained by cutting the stems of pine trees or Coniferae and collecting the sap which flows out. It

consists of a solution of resins in a liquid called 'oil of T.' Distillation in steam causes the essential oil to pass over, a residue of 'colophony' (violin resin) being left behind. Oil of T. is a colourless liquid (sp. gr. .86, boiling point 158-160° C.) which is not constant in composition or physical properties, but varies according to the species of pine from which it is obtained. It is insoluble in water, but is an excellent solvent for phosphorus, sulphur, iodine, and resins, and is, therefore, used in the preparation of paints and varnishes. The oil is used in medicine externally as a counter-irritant. Chemically, oil of T. is a mixture of various terpenes (q.v.) in somewhat variable proportion. The main constituent is pinene, $C_{10}H_{16}$.

Turpin, Archbishop of Rheims, long believed to be the author of a chronicle in Latin prose, narrating the expedition of the Frankish emperor against the Saracens of Spain. It seems to have sprung out of the epic ballads and traditions of the Carolingian heroes, but through the legendary manner in which they are told there is visible a monkish aim—viz., to encourage the foundation of churches and monasteries, the undertaking of religious wars against the Saracens, and, above all, the pilgrimage to San Jago de Compostella. The chronicle has been printed in Reuberus's edition of the *Scriptores*.

Turpin, Richard (Dick) (birth variously stated at 1706 and 1711, hanged 1739), an Eng. highway robber whose daring exploits on his mare 'Black Bess' have secured for him an almost legendary renown (see Harrison Ainsworth's *Rookwood*). T. was the son of an Essex innkeeper, and began his predatory career by cattle-stealing when apprenticed to a butcher (see Wheatley, *London, Past and Present*). Ultimately convicted at York of horse-stealing.

Turquoise, or Callaité ($Al_2O_3 \cdot P_2O_5 + 5H_2O$), is a blue or bluish-green mineral which is in great favour as a gem. It is reniform or stalactitic, never crystallised, has a waxy lustre, and is feebly translucent or opaque. (Hardness 6, sp. gr. 2.7.) On placing in hydrochloric acid the blue colour disappears. The best specimens for gems are obtained in Persia, others in India, Tibet, Arabia, and Saxony. See also STONES, PRECIOUS.

Turtle, see TORTOISE.

Turtle Dove, or *Turtur communis*, a summer visitor to Britain, which it leaves about Michaelmas to winter in Africa. It is from 12-13 in. long, with a long, much-rounded tail. The plumage is greyish brown with yellow on

the sides of the head and pink on the neck and breast. The back of the neck and crown are greyish blue, and the legs and toes are red. Two pure white eggs are laid in a rough structure of twigs placed in a tree near the ground. The male assists the female in incubation, and their devotion is proverbial. Another species is the collared T. (*T. risorius*), which is often kept in captivity.

Tuscaloosa, a city of T. co., Alabama, U.S.A., on the Black Warrior R. It is the seat of Alabama University. Has cotton manufactories and lumber-mills, and coal mines in the neighbourhood. Pop. (1930) 20,659.

Tuscany (It. *Toscana*, anct. *Etruria*), a department comprising the S.W. of the N. half of Italy, bounded N. by Emilia, E. by Umbria and the Marches, S. by Latium and W. by the Mediterranean and Liguria. Most of the country is hilly, containing that part of the Apennines known as the Apuan Alps and being bounded on N. and E. by the Etruscan Apennines. The marshy Maremma (850 sq. m.) in the S. was drained by Leopold II. early in the nineteenth century, and now affords pasture to horses and cattle. The Arno is the chief riv., united to the Tiber (E.) by the Chiano Canal. There are nine provs., the total area being 8890 sq. m. Florence, Leghorn, Pisa, Siena, Lucca, and Arezzo are the chief industrial centres. Chianti and Montepulciano wines, oil, grain, flowers, and silk are produced. There is much mineral wealth, and hot springs abound. The Tuscan language became the literary language of Italy. Under the Medici Florence was of supreme importance in T. A grand-duchy of T. was formed (1567); from 1737 it was under the House of Hapsburg-Lorraine, and became part of Italy (1860). Pop. (1928) 2,886,019. See Zobi, *Storia Civile della Toscana*, 1850; J. A. Ross, *Old Florence and Modern Tuscany*, 1904; A. M. and J. W. Cruikshank, *The Smaller Tuscan Towns*, 1912; E. Hutton, *A Wayfarer in Unknown Tuscany*, 1925.

Tuscaroras, a tribe of N. American Indians, driven out of N. Carolina in 1715 by the settlers, and of Iroquoian stock. In the War of American Independence they divided, some fighting for, others against, the Eng. The remnant of them, numbering about 700, is now divided between reservations in Canada and New York.

Tusculum, an anct. tn. of Latium, said to have been founded by Telegonus, son of Odysseus. The modern Frascati is close to the site. From the Battle of Lake Regillus (497 B.C.) till the Latin War of 340 B.C. it remained

faithful to Rome. It was settled again 335 B.C., and from that time followed the fortunes of Rome.

Tussaud, Madame Marie (1760–1850), foundress of the waxwork exhibition in London, b. at Bern, Switzerland. Studied art under her uncle in Paris, and was appointed drawing-mistress to the ill-fated family of Louis XVI. Came to England in 1802 and settled in London, where her exhibition became, and still is, one of the most popular sights of the city. The building was destroyed by fire in 1925, and, being rebuilt, was opened in 1928.

Tusser, Thomas (c. 1524–80), an English poet and writer on agriculture, educated at Eton and Cambridge. He served Lord Paget as a musician for ten years, dedicating to him his *Five Hundreth Poynties of Good Husbandrie united to as many of Good Huswifery*, 1573. An autobiography in verse is prefixed. See Payne and Herrtage's reprints (1878).

Tussock Grass, or *Dactylis cæspitosa*, a tall-growing grass, native of the shores and sand dunes of the Falkland Isles. It has been introduced into Britain, and in a few places is cultivated as a fodder for cattle. The name is also given to the tufted hair grass (*Aira cæspitosa*).

Tussock Moths (*Dasychira*), a genus of moths, two species of which occur in Britain, the rare dark T. M. (*D. fascelina*) and the pale T. M. (*D. pudibunda*), a common moth of a greyish colour. Its caterpillar, which has a number of tufts or tussocks of hair, sometimes causes considerable damage to hops and forest trees.

Tutankhamen, an Egyptian king of the XVIIIth dynasty, son-in-law of the famous Akhenaton, and conjectured to have been a son of Amenhotep III. A comparatively obscure Pharaoh, T. was one of Akhenaton's adherents in the great religious revolution which Akhenaton tried to achieve in Egypt. On the death of Akhenaton, Smenkhara, husband of the eldest princess, reigned for a short time, and on his death or deposition, T. succeeded to the throne as Tutankhaten, with his seat of gov. at Akhetaten (Tel-el-Amarna). Orthodoxy, however, proved too strong for him, and he had to revert to the worship of Amen and remove the Court to Thebes. He appears to have reigned for no more than nine years, and to have died a young man. But if obscure as a monarch his name has become invested with a rare glamour from the world-famous discoveries made in 1922 in the Valley of Kings by the late Lord Carnarvon and Mr. Howard Carter. The discovery of T.'s funeral paraphernalia proved

the most remarkable in the whole history of Egyptological research, and even if no new historical facts have emerged from the tomb of this king, the treasures found in it must, from their beauty, number and size, contribute much to the increase of our knowledge of the period, some 3300 years ago, when they were fashioned. The find was made in Nov. 1922, after the two explorers had worked systematically for some sixteen years, first at Thebes and later in the abandoned Valley of Kings, before their laborious efforts were rewarded by lighting upon the first intact royal tomb-chamber ever found in Egypt. There was evidence that thieves of ant. times had broken into the outer chambers, but these had been sealed again by the inspectors of Rameses IX. In the outer chamber of the tomb, which lay near that of Rameses VI, were found among other things two life-sized statues of T., chariots, beds, boxes of all sizes and shapes and with every sort of inlay, magnificent alabaster vases, furniture of all descriptions packed close together, and two other statues of the king in bituminised wood with gold ornamentation. Beyond these outer chambers lay the real tomb-chamber, and if the treasures in the outer chambers were remarkable, those in the tomb-chamber beggared imagination. The chamber was filled with the funerary canopy or shrine of this Pharaoh of the New Empire, fully intact; and beneath were revealed types of all the wealth and artistry of ancient Egypt in a profusion never previously revealed to modern man. The canopy itself was of wood, heavily gilded, carved with representations of the buckle of Isis and the Pillar of Osiris and inlaid with panels of blue glaze; and beyond this canopy, behind some bronze-hinged doors, was a second canopy, entirely gilt, which had never apparently been violated. Alabaster vessels, amulets, scarabs of rare colours and precious stones were found between the two canopies and, near the wall of the chamber, the paddles of the royal barge on the waters of the Underworld. But probably the most celebrated of the articles found was the Royal Throne or Chair of State, which is regarded as one of the wonders of the world. It is of wood covered with gold plating and adorned with carved lions' heads, and the seat is patterned with blue, white and gold mosaic squares—the whole effect being gorgeous to a degree. It is impossible to enumerate more than a few of the great number of remarkable articles found, but among the most notable are an ebony and gold figure

of the God Anubis; a gilt coffer 5 ft. high adorned with golden uræi—said to contain the canopic jars in which the viscera of the royal mummy were deposited—and with figures of guardian goddesses wrought with wonderful realism of expression: model boats; ushabti figures in gold and silver; and an ostrich feather fan with carved ivory handle inlaid with coloured stones. *Consult* James Baikie, *A Century of Excavation in the Land of the Pharaohs*, 1929.

Tuticorin, the second seaport of the Madras Presidency, British India, on the Gulf of Manaar. The chief industry is cotton spinning; there are pearl fisheries. Pop. 40,200.

Tutor, in Scots law, the guardian and legal representative of the person and the administrator of the estate of a pupil, *i.e.*, a male child under fourteen and a female child under twelve. Ts. are either: (1) *nominate*, *i.e.*, he who is named by the father or mother in a will or other document; (2) *of law*, *i.e.*, he who succeeds by mere operation of law in the absence of nominate Ts. (seldom resorted to); or (3) *dativo*, *i.e.*, he who applies where no T.-of-law demands the office.

Tutlingen, a tn. in Württemberg, Germany, on the R. Danube. Chief manufs. shoes, leather goods, and cutlery. Pop. (1923) 16,281.

Tuzla, chief tn. of Dolina Tuzla dist., Yugoslavia, on the Jala. Coal, timber, and cattle trade; also salt springs and alkali works. Pop. 13,350.

Tver: (1) A prov. of the Russian S.F.S.R., N. of Moscow, in the Moscow Area. It is on the S. slope of the Valdai Hills and watered (N.W.) by the Upper Volga, the W. Dwina, and the Msta. (2) The cap. of above, at the junction of the Tvertsa and the Volga. Cotton, wool, and leather goods are the chief manufs. T. is an important river-port and is served also by a canal. In the thirteenth century it was the centre of an independent principality, but it was annexed by Ivan the Terrible, 1532. Pop. (1926) 106,337.

Twain, Mark, *see* CLEMENS, SAMUEL LANGHORNE.

Tweed, a woollen fabric, manufactured in Scotland and Ireland (Harris and Donegal Ts.) and extensively worn. The name seems to be a corruption of 'tweel', or 'twill,' used for materials with parallel diagonal lines over the surface of the cloth.

Tweed, a riv. in the S. of Scotland, and draining most of the E. portion of the Scottish lowlands. It rises in the S.W. of Peeblesshire and flows in a north-easterly direction, between Berwickshire on the N. and Northumberland on the S., entering the North Sea. It has a total length

of 97 m., and drains an area of 1570 sq. m. It is one of the best salmon streams in Scotland, but the fisheries are less important now than they were formerly. The traffic on its waters is chiefly confined to Berwick, and it is navigable only in its last 6 m.

Tweed, William Marcy (1823-78), American political boss; b. April 3, in Cherry St., New York; son of a chair-maker, whose business he learned. Became popular as foreman of America's Fire Engine Co. No. 6. Alderman 1852-53. In Congress 1853-55. Obtained other offices; was state-senator, 1867-71. Appointed commissioner of public works for New York City, 1870, appropriated funds. Proceeded against both civilly and criminally, he was sentenced, Nov. 19, 1873, to twelve years' imprisonment. Released by higher court, June 15, 1875, he was re-confined for want of bail, in actions including one by city for six million dollars. Escaped Dec. 4 by way of Cuba, got to Spain. Extradited, confined in Ludlow Street Jail from Nov. 1876. Died there April 12. *See* Life by D. Lynch, 1927. *See also* TAMMANY HALL AND SOCIETY.

Tweeddale, *see* PEEBLES.

Tweedmouth, a seaport of Northumberland, England, and a suburb of Berwick-upon-Tweed. It manufs. machinery and is engaged in salmon-fishing. Pop. with Spittal 5000.

Twelfth-Day, the festival of the Epiphany, in commemoration of the visit of the three kings to the infant Jesus, kept on the twelfth day after Christmas, Jan. 6. Many ceremonies are connected with Twelfth Night.

Twelve Patriarchs, Testaments of the, a series of writings purporting to give the dying speeches of the twelve sons of Jacob. Each speech develops into an exhortation to avoid some particular sin or practise some special virtue. It is a Jewish work of the second century B.C., but early underwent Christian interpolation. It is referred to by Tertullian and Origen. *See* article in *Jewish Cyclopaedia*.

Twelve Tables, The (Rom. Law). The Duodecim Tabulae or T. T. was the earliest code of Rom. laws and was mainly the work of the decemvirate formed expressly for the purpose of evolving such a code (303 A.U.C. or 451-449 B.C.). The code was the outcome of the successful revolution by which the *plebs*, as opposed to the *populus*, were enabled to insist on a changed polity giving them power and office and an opportunity for preparing a permanent body of law. Hitherto there had been but little direct law-making in early Rome, for the king was the

supreme judge in all cases, deciding civil causes in his quality of *pontifex maximus* or through his subordinate *pontifices*, the whole law (or body of custom) being inextricably interwoven with sacred law. There were, in early times, the so-called *leges regie*, but these were probably only by-laws for the conduct of religious ceremonies. After the expulsion of the kings the plebeians were admitted to the *comitia curiata*, or highest political power, and tribunes were elected to defend their interests. The defect in these innovations, however, lay in the fact that there was still no body of laws to which the *plebs* could appeal when they were wronged; the administration of the laws—such as they were—remained in the hands of the patricians, and there was virtually no appeal from the decisions of the magistrates. Hence after the revolution which saw the institution of the Rom. republic, the famous decemvirate was formed to supersede and incorporate into itself every other magistracy. The decemvirs appointed in the year 303 (reckoned *ab urbe condita* or from the founding of Rome) comprised an equal number of patricians and plebeians, and their task was to collect and embody in the shape of written law all those portions of the customary law which it was most essential for the administration of justice should be perpetuated; and to promulgate or publish the laws so incorporated or codified for the benefit of the whole body of citizens.

The praise which legal posterity in Rome bestowed on the T. T. would lead the student to expect a very different *corpus juris* from that which has actually been handed down in extant fragments. They are not a systematic exposition of Rom. public and private or municipal law as it existed before the irruption of the Gauls; nor is there to be found in them that infiltration of the foreign element which would endow the T. T. with a cosmopolitan or universal character sufficient at all events to merit Cicero's extravagant eulogy of them as 'almost the perfection of human wisdom.' Beyond the possible source in the laws of Solon of certain provisions relating to funerals, foreign sources, such as later were used with such profound effect by the prætors (see *JUS GENTIUM*), are nowhere to be traced. The T. T. in fact merely contain short statements of those points of law which the daily affairs of the average citizen required to be determined and publicly announced. Of necessity these statements were founded on previously existing tra-

dition or custom, and a few of these vague or floating customs had actually been engraved on tablets and publicly displayed. But the T. T. did not codify or incorporate the whole of the pre-existing body of custom, their primary purpose being rather to meet the more pressing exigencies of the time. But in any case they provided an enduring foundation on which was subsequently reared the whole edifice of the Rom. Law of future periods and, as such, they are justly celebrated.

Chief Provisions of the Tables.—The *First* Table concerned proceedings in a civil suit, *e.g.* it provided that every process should be stopped at sunset. The *Second* Table fixed the 'wager' or deposit required in an action. The *Third* related to debts. The debtor, after thirty days, could be brought before a magistrate when, unless he found a *vindex* or surety, the creditor could put him in irons. Opportunity was given for ransom and, if this were not forthcoming, the debtor might be sold in slavery or put to death. The *Fourth* related to *patria potestas* or the powers of the father of a family over his issue. The *Fifth* related to inheritances (*hereditates*) and tutorship or guardianship. Thus, it settled devolution for want of testamentary disposition and declared all women, except the Vestal Virgins, to be in perpetual tutorship. The *Sixth* related to ownership and possession of property, *e.g.* it provided that none but a Rom. citizen could acquire by *usucapio* (a form of prescription); that materials built into the fabric of a house could not be reclaimed by the owner until the house was taken down; and that the ownership in goods sold only passed to the buyer when the vendor was paid or otherwise satisfied. The *Seventh* concerned buildings and land sites, its provisions being rather similar to modern building by-laws, *e.g.* it contained provisions as to overhanging trees and the width of footways. The *Eighth* related to *delicta*, *i.e.* crimes. Death was the penalty for libellous songs and outrages, such as incendiarism or the destruction of crops by night, poisoning, and enchantment. A tariff of penalties was provided, *e.g.* a limb for a limb, 150 asses for breaking the bone of a slave. The *Ninth* related to public law, providing, *e.g.* that the corrupt judge might be punished capitally, a right of appeal to the people from every penal sentence. The *Tenth* concerned funerals and their attendant ceremonial. The *Eleventh* forbade the intermarriage of patricians and plebeians. The

Twelfth related to miscellaneous topics, e.g. it provided that a slave who had done someone an injury might be abandoned by his master to the injured person by way of compensation. It is evident that there must have existed prior to the T. T. a tolerably matured body of floating custom and that such institutions as *usucapio*, *patria potestas*, testamentary and intestate succession, etc., were part of Rom. customary law. Legal historians emphasise the fact that the T. T. clearly recognised four important forms of action, viz. *sacramentum*—once the sole form of action which was available to enforce every kind of right known, and remarkable for a series of symbolic acts and words that are characteristic of most early legal systems; the *judicis postulatio*, a mode of action to settle boundaries; *manus injectio* (laying on of hands), symbolic of the remedy in *personam* or the deprivation of the defeated person of his liberty; and *pignoris capio*, which had to do with taking pledges to satisfy a debt. The T. T., in fixing and promulgating the law, were unquestionably a source of considerable strength to the *plebs*, though the decemvirate, regarded as a crisis in their political development, was not favourable to them, and it was only very gradually that all inequalities between them and the *populus* disappeared. In the study of Rom. Law, however, the fragments of the T. T. which are extant, together with the writings of Gaius (q.v.) and Cicero, and of other jurists such as Ulpian, are of the highest value in enabling us to ascertain the essential features of the private Rom. Law at a period before it had become moulded to a more matured culture. Consult Livy, iii. 31–37; Cic., *De Leg.* ii.; *Rep.* ii. 37, 63; Gaius, *Dig.* x. 1; xlvii. 22. etc.; Schoell, *Legis Duodecim Tabularum*; *Reliquia*, 1866; Moyle, *Roman Law*; Sanders, *The Institutes of Justinian*; Maine, *Ancient Law*, and Hunter, *Introduction to Roman Law*.

Twickenham, a mun. bor. of Middlesex, England, on the l. b. of the Thames, opposite Richmond, a residential suburb of London. Many eminent men lived here in the vicinity of Strawberry Hill, including Pope, Sir Godfrey Kneller, and Horace Walpole. Pop. (1931) 39,910.

Twilight. The diffused daylight which precedes and follows the passage of the sun above and below the horizon respectively is due to refraction, reflection, and dispersion of the light of the sun by the atmosphere, chiefly by means of the dust and water particles contained. Its bright-

ness varies with these conditions, but mostly with the distance of the sun below the horizon; when this exceeds 18° twilight ceases. Beyond the Arctic and Antarctic circles T. increases according to season, extending over many weeks in the spring and autumn. Owing to the increasing angle at which the sun approaches the horizon towards low latitudes, the duration of T. decreases; it decreases also with altitude. At Quito it is no more than twenty minutes.

Twilight Sleep, see SCOPOLAMINE.

Twill, a woven fabric in which the warp is raised one thread and depressed two or more threads for the passage of the weft.

Twinkling, see SCINTILLATION.

Twins generally denote two individuals produced at one birth. The term is used also to describe two similar and equivalent objects, e.g. twin crystals. In its strictest sense, however, the word denotes the result of the division of an organism or of an organ into two equivalent organisms or organs. In consequence, although two animals may be developed and born at the same time, they are T. only if they are the products of the division of a single fertilised ovum. Human 'twins' resulting from the synchronous development of two fertilised eggs are not true T. True T. are always of the same sex, like the Siamese T. are frequently conjoined and often the organs of one are arranged as mirror images of those of the other. Not infrequently one individual is larger than the other, whether the T. are separate or conjoined. Most conjoined T. have separate organs and are connected only by the body wall. Comparatively few early stages in the development of human T. from a single egg have been observed, but evidence shows that T. may develop in one of three ways: (1) The fertilised ovum divides to form a mass of cells, the blastula. This may divide into halves which develop separately. (2) From the blastula, two gastrulae may be formed and develop into two individuals. (3) Early in development fission may occur along the axis of the embryo and so give rise to two partially or completely separate individuals. There is some evidence to show that the tendency to beget T. is inherited by males.

Tyburn, the name formerly applied to the gallows in Middlesex, Eng., which stood at the W. end of Oxford Street, London. The last execution took place there in 1783.

Tyche, see FORTUNA.

Tycho, see BRAHE, TYCHO.

Tyldesley, an urban dist. of Lancashire, England. The chief industry

is cotton spinning. Pop. with Shakerley (1931) 14,848.

Tyler, a city in Texas, U.S.A., 100 m. E. by S. of Dallas. Has various manufs., and is situated in a prosperous agricultural region. Pop. (1930) 17,113.

Tyler, John (1790-1862), tenth president of the U.S.A., b. in Charles City, Virginia. He was called to the Bar in 1809, and in 1811 he was elected a member of the Virginia House of Delegates. In 1816-21 he was a member of the national House of Representatives, and in 1825-27 governor of Virginia, becoming a senator in 1827, when he showed his hostility to a high tariff policy. In 1840 he was elected vice-president, succeeding Harrison the next year as president, in which capacity he stood as it were midway between the two great parties, without the support of either, for though he frequently showed himself in sympathy with the Whigs he was never wholly one of their number; the Whigs themselves refused to acknowledge him as a member of their party. Besides the Ashburton Treaty, the most important act of his administration was the annexation of Texas in 1845. His last years were devoted to the Confederate cause.

Tyler, Moses Coit (1835-1900), an American historian and scholar, b. at Griswold, Connecticut. He was professor of Eng. literature in the University of Michigan, 1867-81, in 1881 he was appointed to the chair of American history in Cornell University, a position he held till his death. He pub.: *A History of American Literature during the Colonial Period*, 1878; *The Literary History of the American Revolution*, 1896.

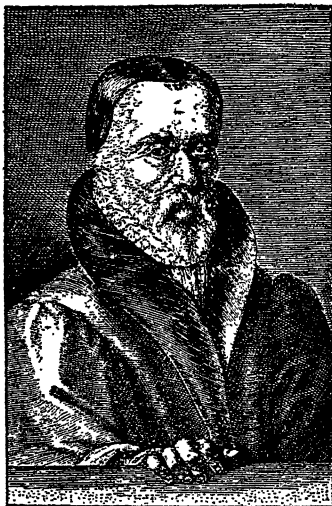
Tyler, Wat, = Wat the tiler; leader of the men of Kent in the rebellion of 1381 in Richard II.'s reign. He had slain a tax-collector for gross insult to his daughter, which incident had set the south-east on fire. The rebels marched on London, releasing the priest John Ball from Maidstone Gaol en route. They burnt Southwark Prison, plundered Lambeth Palace, broke into the Tower, and killed the Archbishop of Canterbury and Sir Robert Hales. At length Wat and his men met the king at Smithfield, when the Mayor of London, Sir William Walworth, slew Wat.

Tylor, Sir Edward Burnett (1832-1917), an Eng. anthropologist, b. in London. He travelled in America in 1855, and the following year visited Mexico, where he became interested in the prehistoric remains and took up the study of anthropology. He recorded his observations in *Anahuac; or Mexico and the Mexicans*

Ancient and Modern, 1861; which was followed by *Researches into the Early History of Mankind*; *Primitive Culture*, 1871; and *Anthropology*, 1881. Died Jan. 2.

Tympanum, in anatomy, the membrane between the external and the internal ear, sometimes called the drum of the ear.

Tynan, Katharine (Mrs. Katharine Tynan Hinkon) (1861-1931), Irish poet and novelist, b. in Dublin, and educated at a Drogheda convent. She began writing at the age of seventeen, and was prominent in the so-called Celtic Revival at the end of the nineteenth century. Her novels include *The Dear Irish Girl*, 1899; *A Daughter of Kings*, 1905; *Her Ladyship*, 1907; *Lost Angel*, 1908; *The Middle Years*, 1917; *The Infatuation of Peter*, 1926. Her books of poems include *Innocencies*, 1905; *Experiences*, 1908; *Lands*, 1908; *Irish Poems*, 1913; *Collected Poems*, 1930.



WILLIAM TYNDALE

Tyndale, William (c. 1490-1536), a translator of the Bible, was a native of Gloucestershire. In 1521 he became chaplain and tutor in a household at Old Sodbury in Gloucestershire, but his sympathy with the new learning aroused suspicion and he removed to London; but finding it

impossible to complete his translation of the N.T. in that city, he went to Hamburg and ultimately to Cologne, where in 1525 he began printing. In 1528 he pub. *Parable of the Wicked Mammon* and the *Obedience of a Christian Man*, and was for a time in Henry VIII.'s favour, but having pub. *The Practice of Prelates* in 1530, he lost the king's good-will. He was arrested for heresy, imprisoned, strangled, and burnt. His fame rests upon his translation of the Bible, consisting of N.T., Pentateuch, and Jonah. See biography by Demaus (1871).

Tyndall, John (1820-93), an Eng. physicist, b. at Leighlin Bridge, co. Carlow, Ireland. In 1848-50 he studied at Marburg under Bunsen. He made important investigations in the Penrhyn slate quarries and in the Alps with Huxley, the result of their labours appearing in *The Glaciers of the Alps* (1860). In 1859 he began his researches on radiation, and later took up the subject of the acoustic properties of the atmosphere. He was president of the British Association at Belfast in 1874, and for some years was scientific adviser to the Board of Trade and to the lighthouse authorities. Among his works are: *Mountaineering*, 1861; *Heat as a Mode of Motion*, 1863; *Fragments of Science*, 1871 (6th ed. 1879); *Floating Matter of the Air*, 1881.

Tyne, a riv. of N. England, formed by the junction of the N. and S. Tyne near the village of Hexham, Northumberland, flowing E. to the North Sea at Tynemouth. Its total length is 45 m., and its principal trib. is the Derwent. Newcastle and South Shields are the chief tns. on its banks. The N. Tyne rises on the Scottish border, and the S. Tyne has its source near Crossfell in Cumberland.

Tynemouth, a mun., co., and parl. bor., seaport, and market tn. of Northumberland, England, on the R. Tyne. An important watering-place, its sands are overlooked by picturesque cliffs. Shipbuilding is carried on, and there are important fisheries and rope and sail works. N. Shields, Preston, Cullercoats, and Chilton are included in the bor. Pop. (1931) 64,910.

Tynwald, a legislative body of the Isle of Man, which with the Lieutenant-governor, the Council, and the House of Keys constitute the gov. The Tynwald Court controls the surplus revenue and appoints boards to manage the harbours, highways, education, local gov., and asylums, subject to the approval of the lieutenant-governor.

Type, in chemistry, a system used

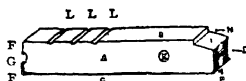
for indicating the structure of certain organic compounds, which were regarded as derived from several simple inorganic bodies by the introduction of various radicals. Gerhardt referred almost all substances to four typical molecules, viz. hydrogen, H; hydrogen chloride, HCl; water, H₂O; and ammonia, NH₃. Kekulé added a fifth T., methane, CH₄. Williamson introduced condensed Ts., and Frankland from the T. theory was led to the theory of valency (*q.v.*). The term is now obsolete.

Type, in theology, some image prefiguring an antetype. The term is applied to the images found in the O.T. of the persons and things of the new covenant. In the Epistle to the Hebrews the comparison is worked out with reference to the Atonement.

Type and Typefounding. As in the earliest days of most handicrafts the craftsman made his own implements and apparatus, so in the inception of typography the printer was his own typefounder; in fact it was not until the seventeenth century that the arts of printing and letter-founding were separated. In the second volume of *Mechanick Exercises*, by Joseph Moxon, 1683, is a very full and practical account of the making of type in his day, and the process remained much the same until the introduction of machinery for the purpose in the middle of the nineteenth century, and with some modifications in the mould is still to a minor extent in use for the casting of small quantities of little-used sorts. Before describing the mould it will be necessary to give some account of the matrix, from which the face of the type is cast, and the punch, by means of which the letter is stamped into the matrix. The punch is a rod of steel about 2 in. long by $\frac{1}{4}$ in. square for pica and smaller sizes, and upon the end of this the letter has to be engraved after the face has been ground true on an oilstone. The outlines having been marked out, the counters are struck in with counter-punches; as the work proceeds impressions are taken in smoke on a smooth paper and compared with the model; this refers to hand-cut punches, but towards the end of the last century machinery was introduced which produces the punches with an accuracy impossible in hand work. The matrix is a small oblong piece of copper, on one side of which and near one end an impression of the die is struck, after which the matrix requires careful adjusting that the impression may be of the correct depth and be in exactly the right position and in perfect alignment

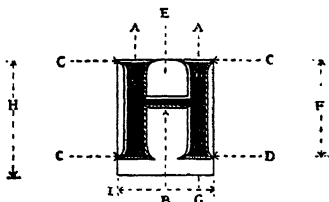
with the rest of the fount. In hand casting the mould was made in two equal portions, of wood lined with iron, and each size of body required a different mould, though the width could be regulated to the width of letter required. When the two portions of the mould are joined in position, with the matrix in its place, a small chamber is left, having for its base that portion of the matrix on which the letter has been struck, and at its top a small hole with a funnel-shaped opening, into which the metal is poured as each type is cast, when, with a peculiar jerk of the left hand, which holds the mould, the metal is sent right home to the deepest point in the matrix. When, on the metal cooling, which it does almost at once, the mould is opened, releasing the type with a tag of metal at the foot—the small quantity which was in the funnel-shaped opening of the mould—this has to be broken away, and afterwards a groove is cut across the bottom of the type where the tag had been. Type casting by machinery is treated together with type-casting and setting machines at the end of this article. The principal element in type metal is lead, varying from 89 per cent. in Moxon's formula to 55 per cent. in some modern ones, but the proportion is made to suit the size and character of the type to be cast. The other principal ingredients are tin and antimony, besides which, copper, nickel, cobalt, iron, and bismuth have been used. When it is considered that the smallest type runs not less than twenty-four lines to 1 in., it will be seen what accuracy must be maintained in the moulds to get the body of each type to the standard size, and in the matrices that the alignment of the face and the thickness of line may be constant. In the list of sizes of type given by Moxon ten only are given, and of these there are two groups of two, of which one is the double of the other, and one group of three, Eng., two-line Eng., and great Cannon, where the latter equals four-line Eng., but there is no correspondence between the various groups. By the introduction from America of the point system, a method was adopted showing the relative sizes of all types, the point being fixed as the 72nd part of an in., and sizes named by the number of points, thus effecting the standardisation of the depth of the types. The varying thickness or set of different letters is inherent in the alphabet we use; *i* and *w* must be cast on different thicknesses of body, but these are now being made proportional. In typefounders' parlance each portion of a single type has its

own name, and in the following block, whose length shows correct type



height, they are as follows: A, body or shank; B, belly or front; C, back; D, face; E, counter; F, feet; G, groove; H, shoulder; I, bevel or beard; K, pin-mark; L, nicks.

Type Design.—Moxon was right in praising the Dutch typefounders of his day for the 'mathematical regularity of their figures,' and 'the true placing of their fats and their leans, with the sweet driving them into one another, and indeed all the accomplishments that can render letters regular and beautiful, do more visibly appear in them than in any letters cut by other people.' The names of the various parts of the face of type, as shown in the accompanying block,

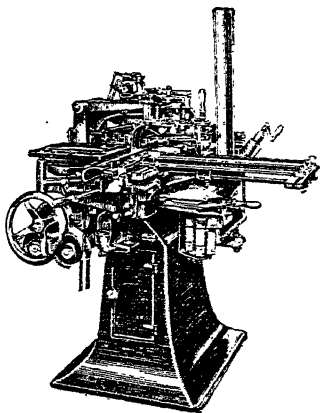


are: A, main stroke; B, hair line; C, serifs; D, line; E, counter; F, line to back; G, beard; H, body; I, set. In considering the beauty of type and its legibility there are various things to be taken account of: the correct placing of the line on the body, so that the beard may be deep enough for the descending letters, and in the lower case that the face of the short letters should leave just the right proportion of space for the ascending letters; that the italic or any other face to be used with the roman should be in exact alignment with it; that the main strokes and hair lines should bear a due proportion to one another; and in the curved letters there should be that 'sweet driving of the fats and the leans into one another' that Moxon speaks of; and this latter characteristic should also be found in the joining of the serifs to the main stroke. Founts of type used for bookwork may be classed as the *old face*, the *old style*, of somewhat lighter face and more regular appearance, and the *modern face*; and with the roman of each of these faces there is the corresponding italic. Besides these faces

used for bookwork there are very many fancy faces used for jobbing work, such as circulars, bill heads, cards, and advertising purposes, and the above-mentioned, as well as the fancy faces, are made not only to the standard set or thickness, but extended or condensed. The standard thickness is judged by placing the whole alphabet, *a* to *z*, in line, when they should measure about 12½ ems of their own body. Again, besides the letter faces of type there are chess and draught faces, playing card and dice faces, music faces, shorthand faces, and many others. The system of logotypes, or types bearing a combination of letters frequently occurring in conjunction, has been tried, notably that under the patent of Henry Johnson, which was adopted by *The Times* in 1782, but apparently was not found to be so great a success as was anticipated. Indeed, unless such a combination occurs more frequently than the least used of the letters, it cannot be a time-saving device. The logotypes actually in use are *fl*, *ff*, *fi*, and *ffl*. See C. T. Jacobi, *Printing* (5th ed. 1910), and *The Times Printing Number*, 1930.

Type-casting and Type-setting Machines. When machinery was introduced for type casting, it was necessary to find some means of forcing the metal into the matrix, which in hand casting had been done by a jerk of the hand after the metal had been poured into the mould from the ladle, and the pump was introduced for this purpose in the early part of the nineteenth century. It was also obvious that if any speed was to be maintained it was necessary to cool the mould by some artificial means; the expansion of compressed air was recommended for this purpose by Brunel, but at the present time water is generally used. The earliest machines for casting type followed pretty closely the hand method, in that the mould was in two parts and was made to approach the nozzle of the pump, to recede from it when the metal had been delivered, to open and eject the type, repeating this action for each type cast. Such machines are still in general use, with the mould working on a pivot to and from the pump, with various cams to effect the opening and closing of the mould and the delivery of the type when cast. They were originally worked by a hand wheel, but now are made to use power, the various actions being controlled by springs. The type turned out by the hand machines, moreover, needs finishing after delivery. The improved pivotal machines, worked by power and water cooled, now turn out the

finished type ready for use at the speed of 3000 ems per hour for pica or 12 pt., or 7000 ems for nonpareil or 6 pt.; of course, with the larger sizes of type the production is much slower, as the type in the mould takes longer to cool. The Wicks Rotary Type-casting Machine was a vast improvement on any previous typecaster, and was constructed on an entirely different principle. Its chief characteristic is the mould wheel, working on a vertical shaft, and having 100 radial moulds. The type was cast in these moulds and ejected on to a delivery chain. According to the size of the type to be cast the speed of this machine varied from 30,000 to 60,000 per hour.



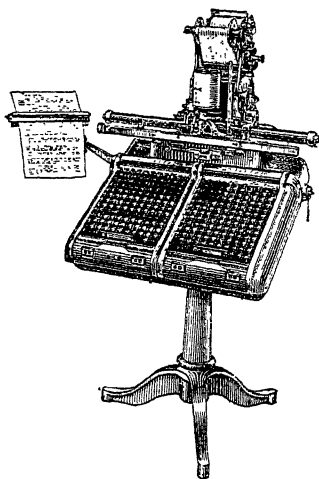
MONOTYPE COMPOSITION CASTER

The *Super Caster* is the latest development (1932) of typecasting machinery, the product of which is not confined to casting type, for on it may be cast leads and rules in continuous strip, automatically cut to desired lengths, quotations, furniture, single or continuous borders, and much other material used by the compositor.

Type-setting Machines may be classified into three types: (a) Those that set type that has been cast by some other machine; (b) those that cast their own type in the order in which it is required for printing the special work in hand; and (c) those that assemble the matrices for a complete line and then cast that line in a single slug. The first mentioned is the earliest invention and, necessitating justification of the line by hand, has been superseded by the machines

of the other two types. Of the second class of type-setting machines the *Monotype* may be taken as an example. This machine consists of two separate parts, the keyboard, which perforates rolls of paper (a translation of the copy into a series of perforations), and the caster, which these perforations guide in its automatic working. The keyboard is similar to that of a typewriter, and the characters are arranged on the same plan, but it is double and contains 276 keys, an arrangement of different colours indicating whether they belong to roman or italic; caps., small caps., or lower case; figures or sorts. Above the keyboard is a strip of paper which is rolled from one spool to another $\frac{1}{2}$ in. at the completion of each letter. Behind the keyboard there is a series of 31 punches, 29 of these working singly and the other two in combination, their relative position indicating the character they represent; one key, the quad., does not perforate. The position of the key struck governs the single punch or combination of punches brought into use, and its depression actuates valves on the supply of compressed air, which sets in motion the required punches. Whilst the perforations for a line of type are being made a device is registering the thickness of every letter composed and counting the number of spaces, and at 4 ems before the completion of the line a bell rings, so that the operator may see if he can complete the word in hand or whether he shall divide it, or if the word is completed whether the next will come in complete or divided. Having included all that the line will contain, the line will need justifying. As the line approaches completion, the justifying drum rotates until it shows, by means of two figures one above the other, which of the keys upon the top and second rows of keys, provided for the purpose, are to be used to effect the justification of the line, which is accomplished by the setting of two differential wedges which divide the surplus space over the number of spaces in the line. The perforated slip is now ready to go to the caster, where it is paid in from the end and works backwards, for it is necessary, as will be seen, that the justification wedges should be in place first or the spaces would not be cast of the correct width. The proper die-case, which consists of a frame 3 in. square, holding the 225 matrices in 15 rows of 15, being selected and put in place, the end of the paper strip is placed under the air-pressure bar and the machine started. Under

this pressure bar, which is supplied with compressed air, is a row of 31 holes leading by tubes into castings at the back and on one side of the die-case, in each of which are fifteen pistons, two of which are forced upwards by the air from the pressure bar passing through the perforations proper for those particular pistons which serve to control the die-case when it has arrived in position to the exposed end of the mould, in which the letter is to be cast, in its correct sequence. Other air tubes set certain rods in motion, which result in casting spaces and regulating their width,



MONOTYPE D KEYBOARD

and in putting the galley motion into action at the completion of each line. Of the third class mentioned above the *Linotype* may be taken as typical. In this machine the matrices are small brass plates keyed at the upper end (for purposes of distribution, which will be explained later) with the matrix proper on one of their vertical edges, some having the same letter in both roman and italic, one below the other, on the same edge. The magazine in which the matrices are stored in the machine consists of a flat metal box sloping towards the front and having separate grooves for each character; the matrices tend to slide down these grooves, but are held in check by escapements until released by the action of their corresponding key on the keyboard, which has 78 keys on the same plan as a

typewriter. As a key is depressed the corresponding matrix is released from its groove and carried by a travelling belt to a slotted assembly box, where it is joined by the others to complete the first word and then by a space band, followed in the same way by other matrices and space bands to the end of the line. When complete the line is carried by special mechanism to the face of a vertical mould wheel, which is the mould proper for the body to be cast to, the matrices in line forming the type face of the slug or linotype. Whilst here the space bands are forced upwards, thus forming perfectly equal spacing between the words and justifying the line. Behind the mould wheel is the pot of molten metal, which has a delivery mouth to fit against the rear face of the mould, and within the pot a mechanically-operated plunger, by which the mould is filled. The mould wheel then makes a partial revolution, turning the mould slot from horizontal to vertical; the linotype is then pushed out between trimming knives into the galley. The matrices are now mechanically raised and pushed on to the distributor bar above the back edge of the magazine, where they hang by the teeth of their keyed end, and are gradually drawn along it by revolving screws until each meets with the gap where none of its teeth has support, and so falls into its own channel. The space bands from which the matrices were separated on their upward journey are returned to their own box by mechanical means.

Another type of machine in this class is the Intertype, which resembles other line composing machines only in general appearance and operating principles. One operator on an Intertype composes and casts type matter of all descriptions, ready for printing, in sizes from 5-point to 60-point, as well as rules and all kinds of decorative and spacing material. As many as 586 characters are available from one Intertype keyboard, and up to twelve 'faces' or styles of type. The type is cast, a line at a time, from brass matrices. Up to twenty matrices of each letter or character to be composed are stored in magazines and released mechanically one at a time by the operator's touch on the keyboard. The released matrices are conveyed in correct order to an assembler (resembling the compositor's 'stick'), with wedge-shaped spacers between the words. When the complete line is assembled, the operator releases it to the casting portion of the machine, where it is automatically justified against a mould of correct size and molten metal

is pumped into the mould and matrices to form the line. The latter is then trimmed to dimensions accurate to within one-thousandth of an inch, and in its turn assembled on a galley in column or page form. Meanwhile, the machine automatically 'distributes' the used matrices and spacers back to their respective magazines ready to be used over again. The complete cycle of machine operations as described above happens seven times each minute. The outstanding feature of the Intertype is its simplicity when compared with other machines of its class.

Typewriter, a writing machine operated by hand for producing characters similar to those of printing. The typewriter in its modern form was invented about 1870 by three men, Sholes, Glidden, and Soule, working together. Their experiments were financed by Densmore. Glidden and Soule retired from the experiments, and afterwards Yost was called in to express an opinion as expert mechanic. Acting on his advice Densmore and Sholes took the machine to the Remington Company, gunmakers, who had suitable tools for making such a machine economically. Remington's took it up and gave it their name; hence the Remington T. It is interesting to note that Sholes, Densmore, and Yost, all invented other Ts, afterwards. All Ts, for letter writing agree in having keys which are depressed by the finger, thereby setting in action certain levers and causing a letter to make an imprint on paper or other material. The imprint is made either directly on the paper, or an inked ribbon is interposed between the letter and the paper. The paper is clamped round a cylinder called the platen. The letters all strike one spot, so the paper must be moved after each letter is struck. It must move also to allow a space between the words; this is done by a spacing key. The platen is mounted in a carriage which is made to move in the direction of its length, and the platen is made to revolve in the carriage. The movement of the carriage is automatic, and is caused by a coiled tension spring attached to the end of the carriage, which is released every time a letter key or the spacing key is struck. It moves an equal amount each time, the amount being the space of one letter. The revolving movement of the platen is made when the carriage is drawn back by hand after the end of a line is reached. The mechanism causes the platen to revolve a certain fixed distance, and this distance determines the space between the lines. Usually there are three of these fixed

distances or spacings, called single, double, and triple spacing. The spacings are altered readily by an adjustable stop. Ts. are either (a) type-bar machines, or (b) type-wheel machines, according to whether the letter is mounted on a lever or on a cylinder. In (a) the key is struck with a staccato blow of the finger, while in (b) the key is depressed with a push action. Nearly all modern machines are of the (a) pattern; the Hammond and Blick are the best-known examples of the (b) pattern. In pattern (a) the mechanism consists of two or more levers, the striking letter being situated on the free end of the ultimate lever. In the Oliver machine the letter is situated on the bottom of a U-shaped bar. The U is inverted and the two ends are pivoted in bearings, which makes an exceedingly strong type bar and gives excellent alignment. In some cases the alignment is 'forced,' that is, the type passes through a hole (as in the Yost) or between guides (as in the Smith-Premier and Barlock). This produces good alignment, but if the type bar does not strike truly the result is either a faint impression or a strain on the finger of the operator. In pattern (b) the mechanism causes the type cylinder to revolve until the correct letter is in the proper position facing the striking point on the platen, and then the cylinder is thrust forward and the impression made. Of course, the whole operation is made by a single depression of the key lever. The great advantage of pattern (b) is that a cylinder may be removed in a few moments and another cylinder with entirely different type inserted. This gives a wide range of types on the same machine. The impression is made on the paper in ink. Machines are pad or ribbon machines. In pad machines the letter on the type bar takes the ink from the pad and impresses it on the paper; in ribbon machines an inked ribbon is interposed between the letter and the paper, and the impression is made by the letter striking the ribbon. The clearest writing is made by pad machines on account of the letter striking directly on the paper. The Yost is the best-known pad machine, nearly all others being ribbon machines. The ribbon is mounted on two spools which revolve automatically through a small arc when the key lever is depressed, so that the letter strikes a fresh part of the ribbon each time, otherwise a hole would be made in the ribbon after a few blows. When the ribbon is wholly unwound from one spool, a ribbon shift key reverses the motion and the ribbon moves in

the opposite direction. The letters on the keyboard are not arranged alphabetically, but an arbitrary arrangement has been adopted whereby the letters most used are in the middle and therefore directly under the fingers. Several arrangements have been suggested, the one now generally adopted being as follows:—

q w e r t y u i o p
a s d f g h j k l
z x c v b n m

The numerals, punctuation marks, and other figures are placed in different positions on different machines. The earliest machines had only one set of type, viz. capitals; later models were fitted with an additional set of bars and keys carrying the small letters. This produced an unwieldy instrument, known as the double-keyboard type, having a separate key for each character. These have been superseded by the modern shift-key T, where two or three letters are fixed at the end of each bar and a shift key throws the carriage backwards or forwards in order to bring the paper in the correct position under the letter. The keys are marked with letters and figures similar to those on the corresponding type bars. In the single-keyboard machine the key must be marked with the several characters which are affixed to the type bar, but the same letter stands for both capitals and small letters. A greater speed is obtained with the single-keyboard machine as fewer keys have to be memorised and this more than compensates for the additional labour in depressing the shift key. The first machines were 'blind,' that is, the writing was made from below upwards, the letter striking the bottom of the platen, which made it necessary to lift the carriage in order to examine the writing. In the 'visible' machines the writing is done in sight and the ribbon must be removed immediately after the impression is made, which necessitates a ribbon-throw mechanism. The general design of the T. seems to be fixed, but many small improvements are made, some being valuable, while others are merely 'selling points.' One valuable addition is a back spacer. The depression of a key throws the carriage back one space, so that a letter which has been written wrongly (the most frequent error in typing) or missed out can be corrected with the least possible waste of time. The platen is frequently made to revolve independently of the spacing ratchet, which enables the operator to write exactly on a ruled

line. Tabulators are now incorporated with nearly all machines and are indispensable for accountancy and such-like work. The cutting of stencils for duplicating work is an important function of the T., and the Oliver machine is pre-eminent in this respect on account of the type bar already referred to. When only a few copies of a letter or document are required, carbon paper may be inserted between sheets of writing paper, and in this manner as many as twelve copies of one original may be made with thin paper and carbons. Carbon copies are frequently used for office filing, thus taking the place of the letter book. The speed obtainable depends on the skill of the operator rather than on the make of the machine. An expert can write about 160 words a minute.

Typha, a genus of aquatic plants with sword-shaped leaves and long cylindrical brown spikes of female flowers, surmounted by a slender deciduous spike of male flowers. *T. latifolia*, great reed mace, cat's-tail, or 'bulrush,' is a large and handsome plant, the down of which was formerly used in stuffing pillows and mattresses.

Typhoid Fever, *see* ENTERIC FEVER.

Typhon, or Typhœus, in Gk. mythology, was a monster with a hundred heads who was subdued by Zeus and buried in Tartarus under Mt. Ætna, the workshop of Hephestus. According to Homer, he was concealed in the earth in the country of the Arimi, which was lashed by Zeus with flashes of lightning. He was the youngest son of Tartarus and Gæa, and by Echidna became the father of the dog Orthus, Cerberus, the Lernean hydra, Chimæra, and the Sphinx. He also begot the dangerous winds, and is sometimes called the father of the Harpies.

Typhoons, small cyclones occurring in the tropics, particularly in the China Sea, from July to Nov.; as hurricanes they occur in the W. Indies. Normally the air of the tropical belt shows little cyclonic disturbance, since there is little differential rotational effect near the equator. When the belt, in following the sun N., reaches a region of rotational velocity of quicker diminution, the convectional currents take it up, and the storms generated travel westwards with a northerly inclination, and finally pass out into the westerlies before dissipating on a N.E. course. Ts. are notable for the patch of clear blue sky in the central calm area, which is nevertheless dangerous to sailing vessels; these are unable to keep way in the midst of great waves, and may be struck again

at any moment from any direction as the storm travels on. The rapid fall of the barometer gives short warning of approach, but the navigator may be sure in his calculation of wind direction and find the safest path. To sailing vessels Ts. are very dangerous, but modern steamers can negotiate all but the most severe. In the China Sea and Gulf of Mexico they are of sufficient violence to give rise to 'tidal waves,' which are destructive to ports and shipping.

Typhus Fever (Gk. *typhos*, mist or stupor), an acute contagious disease, characterised by a high fever, severe nervous symptoms, and a peculiar rash. Complete agreement does not yet exist as to the microbiology of T., but the causal agent is probably a dumb-bell-shaped protozoon known as the *Rickettsia protozeeki*, so called after the names of the investigators who lost their lives in the study of the disease, by Da Rocha Lima, who also conducted researches. T. has been known in Europe since the eleventh century. The conditions predisposing to it are bad sanitation, overcrowding, starvation, etc. The disease is most frequent in war time, especially among prisoners and refugees and in invaded territories, as was exemplified during the Great War in Serbia, Rumania and Poland. T. is chiefly confined to cold and temperate climates—notably Russia, Poland, and Northern Africa. This incidence is not referable to mere cold but to the overcrowding endemic in those countries, and the defective ventilation, coupled with the greater possibilities for dissemination by infected lice. It is, indeed, a lice- or flea-borne disease, or, as some say, it is transmitted by the louse and by the louse only. It is most frequent and characteristic in adults but children are by no means exempt, though it usually assumes with them a milder form. The mortality has been estimated at about 18 per cent. of cases, but the rate varies greatly according to whether the means of proper treatment are or are not available. The period of incubation is usually from seven to ten days, during which only a slight general debility is observed. The fever is ushered in with rigors, after which the temperature rises to 103° or 105°, attaining a maximum about the seventh day, when it remains steady or gradually becomes lower. The tongue is first of all coated with a white fur, which afterwards becomes yellow or brown. The teeth are coated with sordes. There is usually a degree of constipation and the urine is scanty. At the fourth or fifth day the characteristic eruption appears.

This consists of spots or blotches of rose colour, appearing chiefly on the abdomen and flanks; they are for the most part petechial in character, that is, they consist of subcutaneous effusions of blood. The patient is very feeble and generally in a state of wakeful stupor, staring with contracted pupils and diminished capacity for perception. The *crisis* occurs about the fourteenth day, and if favourable is marked by a fall in temperature, free perspiration, and amelioration of the distressing symptoms. The chief points involved in the treatment of T. F. are good nursing, fresh air, and a milk diet. Consult Woebach and others, *The Etiology and Pathology of Typhus* (Cambridge, Mass. 1922); article on 'Typhus Fever,' by J. D. Rolleston, in *Dictionary of Practical Medicine*, ed. by Sir Malcolm Morris, and others, 1921.

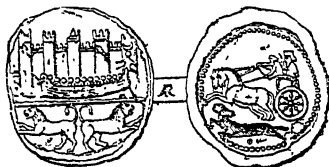
Tyr, in Norse mythology, a son of Odin, and god of war. His right hand is sacrificed in the struggle with the monster Fenriswolf, the son of Loke, in the great battle between the good and evil principles. He succeeds in slaying Garm, the terrible hound of the Gnipa cave, but receives his death-wound in the conflict. From his name is derived the word 'Tuesday,' through the Anglo-Saxon *Tiwes daeg*. Tyr's day.

Tyrant (Gk. *τυραννος*), the name given by the anct. Gks. to a man who availed himself of the discontent of a people to win popularity and then to overthrow the existing gov. and possess himself of the sole authority. Where a T. did not abuse his power, the people often fared better under a 'benevolent despot,' while a tyranny often encouraged new developments in the state. Such tyrannies arose most commonly in the seventh and sixth centuries B.C., and many of the Ts. of this time have earned a high reputation by the impetus they gave to trade, commerce, and architecture, and by their encouragement of art. The dislike of monarchs in general, however, led men to associate the name of T. with the idea of a cruel and arbitrary ruler, and its modern bad meaning is also largely due to the ultra-constitutionalists of the fourth century in Athens, to whom the democracy of Pericles was the ideal of gov.

Tyrconnel, Richard Talbot, Earl of (1630-91), *b.* in Ireland. In 1687 was made lord-deputy of Ireland. He fought hard against the Protestant ascendancy, and when William III. raised the siege of Limerick fled to France, to return in 1691 with small authority. He *d.* the same year.

Tyre (modern *Sur*), an anct. tn. of

Syria, built partly on an island and partly on the mainland. It was the principal seaport of the Phoenicians, and as such known to the Gks., but was sacked by Alexander in 322 B.C. and did not recover. It was, however, a flourishing port under the early Rom. emperors, and a place of considerable importance in mediæval history, especially as the stronghold of the Crusaders (1124-1291).



COINS OF TYRE

But after the fall of Acre the Christians deserted the city, which was then destroyed by the Moslems. The modern city is now a seaport in the Lebanese Republic. Pop. 6000.

Tyree, or Tiree, an island of the Inner Hebrides, Argyllshire, Scotland. Hynish in the S. has granite quarries. Pop. (1921) 1716.

Tyres (rubber) are fitted round the rims of bicycle, automobile, and other road-vehicle wheels to reduce vibration and road shocks, and they may be either solid or pneumatic. Robert Thompson, an Englishman, patented in 1845 the first pneumatic rubber T. With the development of the bicycle the use of pneumatic Ts. increased, and due to patents granted to John Dunlop in 1888-89 and later to John Palmer and others, their design and reliability were greatly improved. Pneumatic Ts. were first fitted to motor cars by the Fr. firm of Michelin. Solid Ts., as the name implies, consist of a solid band of rubber compound of roughly rectangular cross-section, attached firmly to the rim of the wheel for the purpose of absorbing the vibrations and resisting abrasion. The modern practice is to key the rubber to the outside of a stout, circular steel band which is forced by hydraulic pressure over the periphery of the wheel. The advantage of this type of T. is the absence of punctures, but with the high standard of perfection reached by the modern pneumatic T., solid Ts. are gradually going out of use. In the case of pneumatic Ts., the loads are carried and shocks absorbed by compressed air contained in an endless rubber inner tube placed round

the circumference of the wheel and held in place and protected by an outer cover. Modern covers have a foundation of specially woven cotton material, called cord fabric—which, after being coated with rubber, and shaped, has a thick coating of a tough rubber compound vulcanised to it. (See RUBBER.—*Vulcanisation*.) This rubber coating is made specially robust at the tread where wear takes place, whilst the shape of the tread is designed to resist skidding. Modern covers are almost invariably of the wired-edge type, *i.e.* they are held on to a specially shaped rim by means of inextensible wire rings incorporated in the construction of the cover. There are two types of pneumatic Ts, in use to-day, the high pressure and low pressure, or balloon, types.

Tyrol, or Tirol, the most westerly prov. of Austria, bounded on the N. by Bavaria, on the S. by the Italian prov. of Tridentina, on the W. by Switzerland, and on the E. by the Austrian prov. of Salzburg. Area 4882 sq. m., but prior to its partition under the Treaty of St. Germain the area was over 10,000 sq. m. It is traversed from W. to E. by the main chain of the Alps, but the loftiest peak, Ortler Spitz (12,802 ft.), lies in Italian territory. The other groups of mountains are the Oetzthaler Alps (also partly in Italian T.), Stubai, and Ziller Thal Alps, which connect the Rhaetian Alps of Switzerland with the Hohe Tauern in the E. of the T., where they attain their culminating point, Gross-Glockner (12,455 ft.), on the frontiers of T., Salzburg, and Styria, and separate the valley of the Inn in the N. from the valleys of the Drave and Adige in the S. Besides the rivs. already mentioned, the N.W. is watered by the Ill and Bregenz, flowing into Lake Constance, which forms the N.W. boundary. The climate is severe in the uplands, but in the narrow valleys of the S. is warm and similar to that of Lombardy. T. is above all a pastoral land, the cattle as in other Alpine lands being the mainstay of the peasants; but forestry also employs a certain proportion of the pop., and the saltworks of Halle, near Innsbruck, are famous. There are also factories for preserved fruits and tobacco. Capital, Innsbruck. T. was in Roman times inhabited by the Rhaetians. It passed into the possession of the now dethroned House of Hapsburg in the thirteenth century. Pop. (1923) 313,885. For the South Tyrol question, see under AUSTRIA-HUNGARY.

Tyrone: (1) A co. in the prov. of Ulster, Northern Ireland, bounded W.

by Donegal, S. by Monaghan and Fermanagh, E. by Lough Neagh and Armagh and N. by Londonderry. It is hilly in the N. and S., the principal ridges being the Sperrin Mts. (2240 ft.) in the N.E. and the Slievebeagh (1255 ft.) in the S. The prin. rivs. are the Strule and its tributaries, of which the chief is the Derg, the Blackwater which forms its S.E. boundary, and the Foyle, which bounds it in the N.W. In the E. is a fertile plain, and agriculture flourishes. Oats is the chief grain crop, and potatoes, flax, and turnips are grown; a considerable area is occupied by pasture, and cattle are reared in large numbers; poultry are also kept. Some coal is mined. Linens and coarse woollens (including blankets), soap, candles, and earthenware are manufactured. It returns five members to the N. Parliament, and with Fermanagh returns two members to the Imperial Parliament. There are several interesting ruins in the co. The area is 1260 sq. m. Pop. (1926) 132,792. Omagh is the co. tn. (22) A bor. of Blair co., Pennsylvania, U.S.A., on the Little Juniata R. in an agricultural dist. Limestone is found, and coal is brought here from the Clearfield coal mines. A considerable trade in lumber is carried on, and there are railway repair shops. Pop. (1930) 9042.

Tyrone, Hugh O'Neill, Earl of (c. 1540–1616), an Irish rebel, frequently engaged in intrigues against Elizabeth. He eventually promised submission, but was afterwards regarded with suspicion and forced to flee in 1607, dying at Rome. His nephew, **Owen Roe O'Neill** (c. 1590–1649), fought in Ireland in 1642, being chosen general by the Ulstermen, and was successful against the Eng. and Scots.

Tyrrrell, George (1861–1909), an Irish divine, b. in Dublin of a Protestant family. He entered the Rom. Catholic Church and became a novice in the Society of Jesus. He was ordained a priest in 1891 but came into conflict with the Church for upholding modernism. Following an open *Letter* he was dismissed from the Society of Jesus and suspended from the administration of the Sacraments in 1906. In Oct. 1907 he was excommunicated but received absolution on his deathbed. He formed a close friendship with Baron von Hügel in 1897 which lasted until T.'s death. His best-known writings are: *Nova et Vetera*; *The Faith of the Millions*; *Hard Sayings*; *Through Scylla and Charybdis* (wherein he evolved his idea of revelation as experience); and *Medievalism*.

Tyrrhenian Sea (anct. *Tyrrhenum*

Mare), that part of the Mediterranean Sea between Italy and the islands of Corsica, Sardinia, and Sicily.

Tyrtaeus, Gk. poet of seventh century B.C. According to the legend, the Spartans on the outbreak of war with the Messenians sought counsel of the Delphic Oracle, and were told by Apollo that, would they win, they must send to Athens for a leader. Appealed to, the Athenians dared not disobey the god, so gave their rivals the Spartans a lame schoolmaster, as the least likely to help them. But when Tyrtaeus thus reached Sparta, his rousing speeches and warlike songs so inspirited one and all that the Messenians were totally defeated. To this day 'Tyrtaean Ode' remains proverbial. See Murray, *Ancient Greek Literature*.

Tyrwhitt, Thomas (1730-86), an Eng. classical commentator, *b.* in London. He was master of both Eng. and classical literature, and published editions and emendations of classical authors, including: *Aristotelis de Poetica Liber, Graece et Latine*, 1794; *De Lapidibus*, 1781; *Observations . . . upon . . . Shakespeare*, 1766; *The Canterbury Tales of Chaucer*, 1775; and *Poems supposed to have been written . . . by Thomas*

Rowley, which was the chief work exposing the Rowley forgeries as the work of Chatterton. The modern recognition of Chaucer as a great poet is due to T.'s discovery of the principles of Chaucer's versification.

Tzana, see DEMBEA.

Tzar, see TSAR.

Tzarskoye, see TSARSKOYE SELO.

Tze-Hsi (1834-1908), Dowager Empress of China, *b.* of humble parents, but being sold as a slave became the property of a famous general, who gave her as a present to the Emperor Hsien-Feng. On the death of Hsien-Feng (1861) she became regent, administering the national affairs with more vigour than any of her predecessors until her son came of age, and after his death (1875) acted in the same capacity for her nephew, Kwang-Hsu. Her death in 1908 removed a powerful opponent to the new régime, and with her passed away the last prominent representative of the old era in China.

Tzetzes, Johannes (c. 1120-83), a Gk. author, wrote commentaries on Homer, Hesiod, and Aristophanes, besides *Iliaca*, a poem concerned with the story of Troy, and *Chiliades*, a collection of mythical and legendary tales.

U, the twenty-first letter of the Eng. alphabet, and the last of the five vowel sounds, intimately connected with *r* and *w*. With the former of these the symbol *u* was interchangeable until the spelling settled down at the end of the seventeenth century. The original sound of M.E. short *u* is preserved in such words as *put* and *pull*, while provincial pronunciation retains it more widely. For the pronunciation of *u* the breath passage is wider than for that of any other vowel, and hence its tone is low and vibrant. In chemistry, *U* is the symbol for one atom of uranium.

Ubangi or **Mobangi River** is the chief right-hand tributary of the Congo, in the Congo Free State. Called the *Makua* in its upper course, it joins the Congo a little to the S. of the equator. Length about 1500 m.

Ubeda, a city of S. Spain in the prov. of Jaen, in a fruit-growing and vine dist. It has linen and esparto-grass industries. There is a cathedral and interesting old Moorish walls. Pop. 19,910.

Überweg, Friedrich (1826-71), a Ger. philosopher, *b.* at Leichlingen, Prussia; educated at Göttingen and Berlin. In 1868 he became professor of philosophy at Königsberg. His best known works are: *System der Logik und Geschichte der logischen Lehren* (1857; Eng. trans. by Lindsay, 1871); and *Grundriss der Geschichte der Philosophie* (1863-66; Eng. trans. by Morris, 1871). See *Memoirs*, by F. A. Lange, 1871, and M. Brasch, 1889.

Ucayali, a riv. of Peru, E. of the Andes, unites with the Marañon to form the prin. stream of the Amazon, 900 m. from its source. It is navigable to Sarayacu. Length (estimated) 1500 m.

Uccello, or **Ucillo** (1396-1475), the name given to the painter and sculptor, Paolo di Dono, from his love of painting birds. He was *b.* in Florence, and became one of the assistants of Lorenzo Ghiberti in constructing the bronze gates for the baptistery. His 'Battle of Sant' Egidio' (1416) is in the National Gallery, London; his 'Equestrian Portrait of Sir John Hawkwood'

(1436) and some of his frescoes are in the Duomo, Florence.

Uckfield, a market tn. and par., Sussex, England, on the R. Ouse, 8 m. N.E. of Lewes. It has an agricultural college. Pop. (1931) 3557.

Udaipur, **Oodeypore**, **Odeypoor**, or **Meywar**, a feudatory state and cap. in the Rajputana dist., India. State area 12,700 sq. m.; pop. 1,380,000. The cap., Udaipur, is situated on Lake Pichola; it contains palaces of marble and granite, and in the vicinity is a fine fifteenth-century temple. Pop. 35,000.

Udal, see **ALLODITUM**.

Udall, or **Uvedale**, **John** (c. 1560-92), a Puritan divine, who was prosecuted (1586) and deprived (1588) of his living at Kingston-on-Thames for his tracts against episcopacy. In 1590 he was condemned to death on a charge of complicity in the Marprelate tracts, but was pardoned in 1592. He wrote *The Key of the Holy Tongue*, a Hebrew grammar and dictionary (pub. 1593).

Udall, Nicholas (1505?-56), Eng. dramatist and scholar, *b.* in Hampshire, and educated at Corpus Christi College, Oxford. From 1534 to 1541 he was headmaster of Eton, and in 1554 headmaster of Westminster. He translated part of the *Apophthegms* of Erasmus; also Peter Martyr's *Discourse on the Eucharist* and Thomas Gemini's *Anatomia*. He is best remembered for his *Ralph Roister Doister* (1533), the first Eng. comedy, a rude but lively piece. Reprinted by Arber, 1868; also in J. M. Manly, *Specimens of Pre-Shakespearean Drama*, 1897.

Uddevalla, a seaport tn. of Gotebörg, Sweden. It has shipbuilding, wool and textile industries, wood pulp mills, and sugar refineries. Pop. (1929) 14,499.

Udine, an Italian tn., 60 m. N.E. of Venice. It contains an old castle, once the residence of the patriarchs of Aquileia and now a prison; a cathedral, containing fine sculptures and paintings; law courts, a tn. hall, and various hospitals. It manufs. silk and leather goods. Pop. 58,000.

Ufa, a tn. of the Russian S.F.S.R.,

cap. of the Aut. Republic of Bashkir. It stands at the confluence of the Ufa and the Belaia, 200 m. N. of Orenburg. It is walled and defended by a citadel. A considerable trade is carried on in corn and cattle. Pop. (1926) 89,550.

Uganda, a British Protectorate in E. Africa, bounded on the E. by Kenya Colony; on the S. by Tanganyika Territory and the first degree of S. latitude; on the W. by the frontier of the Belgian Congo (Lake Edward and the Semliki R. and Lake Albert), and on the N. by the Uganda-Sudan boundary. Area estimated at 94,204 sq. m., of which 13,616 sq. m. are water. The country has not yet been completely surveyed. The Protectorate comprises four provs.: Eastern, Northern, Western and Buganda. Entebbe is the headquarters of the administration, and the chief commercial tns. are Kampala and Jinja, all three tns. being on or near the N. shore of Lake Victoria. The climate is mild and not unpleasant, but there are parts of the country which are by no means healthy. The conditions vary with the altitude. The lowest rainfall for 1929 was recorded at Butiaba, 27.85 in., the highest at Kalangala, 76.23 in. No part of U. is absolutely free from malaria, and along the courses of the larger rivers it prevails at all seasons of the year. Sleeping sickness, which was a scourge about thirty years ago, is now well under control. Plague and smallpox are endemic in the native pop. The country is divided by the Rift Valley. The chief mountain is Mt. Elgon, while the country is watered by the R. Kagera and the lakes above mentioned and Lake Rudolf. There is a large mineral reserve, including gold, copper, iron, and graphite, and there is a rising export of tin-ore. The coffee plant has been introduced and thrives well; the *Arabica* variety is the chief crop on European plantations. The prin. industry is cotton (exports of lint and seed reached £3,600,000 in 1929); rubber, hides, and skins, ground-nuts and chillies are the other principal agricultural exports. Cattle are plentiful. Since the Great War considerable railway development has taken place, and a main line of the Kenya and Uganda railway, leaving the original line at Nakuru, extends into the Eastern Province to join the Jinja-Namasagali Railway at Mbulamuti, and thereby places U. in direct communication with the coast. An extension of this line from Tororo to Mbale and Soroti was completed in 1929, and Jinja was linked up with Kampala by 1931, this line bridging the Victoria Nile at Jinja. There are

aviation landing grounds at Entebbe, Tororo, and Jinja, and landing facilities for seaplanes at various places. The administration is under a governor assisted, since 1920, by an Executive Council and a Legislative Council. The native gov. of Buganda has certain rights of internal legislation granted by agreement. The king or *kabuka* rules the Buganda people with the advice of the governor and of a native council, which also has judicial functions.

History.—The Hamitic races invaded U. about 5000 years ago, thereby modifying the ethnological features of the country. In 1857 Mutesa, king of U., entered into political relations with the British agent at Zanzibar. Sir H. M. Stanley visited the country in 1875, and on the invitation of the king introduced Anglican missionaries. Immediately there commenced a rivalry between Protestants, Rom. Catholics, and Mohammedans. In 1884 Mutesa was succeeded by Mwanga, who commenced a series of terrible and bestial orgies, which resulted in Mohammedans and Christians uniting to depose him, whereupon he fled. Then commenced a struggle between Mohammedans and Christians, resulting in the temporary supremacy of Islam. This was followed by various attempts of adventurers and missionaries to gain political influence for their various countries. Mwanga had been replaced on his throne and all differences settled by 1895, when U. was declared a protectorate. The pioneers in the advancement of U. were Grant and Cunningham. Berkeley was the first commissioner, and gradually U. advanced in prosperity, after the rebellion of 1897 and the Sudanese mutiny were quelled and Mwanga finally deposed and deported to the Seychelles. In the Great War, the pop. of all races remained very loyal and played a great part in the E. African campaign. Since then progress, material and cultural, has continued, the former through the success of the cotton industry, the latter through the activities of the missions, both Protestant and Catholic, in whose hands all educational work remained till 1925. Pop. (1931 census): Europeans 2023; Asiatics 15,077; Africans 3,515,910. See Speke, *Discovery of the Sources of the Nile*; Wilson and Felkin, *Through the Dark Continent*; Sir H. Johnston, *The Uganda Protectorate*; Sir F. Treves, *Uganda*; J. F. Cunningham, *Uganda and its Peoples*, 1905; H. R. Wallis, *The Handbook of Uganda*, 1920; C. J. Roscoe, *The Bagisu and Other Tribes of the Uganda Protectorate*, 1924; J. W. Gregory, *The Great Rift Valley*, 1896.

Ugolino, Brunforte (1262-1348), supposed author of the *Fioretti* or *Little Flowers of St. Francis*. His father was Seigneur of Sarnano in the March of Ancona, and at the age of sixteen he joined the order of the Brothers Minor in the Convent of Roccafranca; on account of his virtue and learning, he was elected Bishop of Teramo, but his election was not confirmed by the Pope. In 1344 he was elected Provincial of Macerata. Some authorities believe that Ugolino was the author of the Latin version of the *Fioretti*, which is the original form of the work. See *The Little Flowers of St. Francis*, trans. T. W. Arnold (Temple Classics).

Ugolino della Gherardesca (d. 1289), immortalised in Dante's *Inferno* as Count Ugolino, was a Neapolitan who endeavoured to usurp the gov. of Pisa. Succeeding after some time in this attempt, he governed the country with great vigour. The Archbishop of Pisa, Roger de' Ubaladini, formed a conspiracy against him in 1288; and attacking U. in his palace, defeated and took him prisoner. He was eventually starved to death along with his children.

Ugrian, the name applied to a Finno-Turki family originally found E. of the Urals. The chief branches are the Finns, the Ostiaks, the Voguls, and the Magyars.

Uhland, Johann Ludwig (1787-1862), a Ger. poet, b. at Tübingen, where he graduated in law (1810), and later became professor of Ger. literature (1829-33). After a sojourn in Paris, during which he spent most of his time studying mediæval literature, he took up an appointment in the law courts at Stuttgart (1812-14). By this time he had already written a number of poems (since 1807), and an historical thesis, *Das altfranzösische Epos* (1812). In 1815, having decided to take up literature as his profession, he published a collection of his poems, *Gedichte*, which went through about fifty editions during his lifetime. This was followed by two dramas, *Ernst, Herzog von Schwaben* (1818), and *Ludwig der Bayer* (1819), which although fine in sentiment are not suited for stage production. His poems are mediæval in spirit, and are a typical product of Romanticism, although of perfect finish. Besides U.'s literary exertions, he figured with some prominence in political life, being a member of the Frankfurt Parliament in 1848. See *Life* by H. Fischer, 1887, who also edited his works, 6 vols., 1892.

Uhlands were originally Polish cavalrymen employed in reconnoitring, outpost duty, etc. The name is particularly applied to the Prussian

cavalry regiments armed with the lance, and first formed in the eighteenth century. The pre-war U. regiments have been reduced to about forty squadrons affiliated to the various thirty-six existing cavalry regiments.

Uigurs, an historical Turkish race who inhabited Eastern Turkestan. They were the founders of the kingdom of Hiong-Nu, the southern empire of which was destroyed by the Tunguses in the third century A.D. The Southern U. then founded the kingdom of the Huns. The northern U. were at the zenith of their power and civilisation in the fifth century A.D. They became followers of Islam, but their religion shows Buddhist, Chinese, and Zoroastrian influences. They probably taught Syrian writing to the Mongols and Manchus. The race is now merged with surrounding peoples.

Uintah, a mountain range in Utah, U.S.A., extending into Wyoming. The highest points are Gilbert Peak (13,680 ft.), Emmons Peak (13,694 ft.), Mt. Hodges (13,500 ft.), and Dawes Peak (13,300 ft.). The Green R. and the Uintah R. have cut deep gorges in the range.

Uist, two islands of the Outer Hebrides, Inverness-shire, Scotland: (1) N. Uist lies 8 m. S.W. of Harris, and is separated from Skye by the Little Minch. It is 18 m. long, and from 3 to 14 m. wide. It is very hilly in the W., the highest peak being Mt. Eaval (1138 ft.), and on the E. has the two sea lochs of Eport and Maddy. Lochmaddy is the chief village. Pop. (1931) 2832. (2) S. Uist is situated 7 m. S. of N. Uist, Benbecula lying between, and has a maximum length and breadth of 22 and 8 m. The principal sea lochs, Boisdale, Skipport, and Eynort, are on the E. coast. Lochboisdale is the chief village. Pop. (1931) 4236.

Uitenhage, a tn. in the dist. of Uitenhage, Cape Province, S. Africa. It is an important agricultural centre. Pop. white (1926) 5121.

Ujiji, a tn. in E. Africa, on the eastern shore of Lake Tanganyika. U. was a great Arabic trading centre in slaves and ivory. It lies below one of the few breaks in the line of cliffs forming the eastern side of the lake, but owing to one of the curious periodical changes in the level of the water the harbour is now shallow and full of weeds and papyrus. In 1890 the tn. came under Ger. rule. In July 1916 it was occupied by a Belgian force, which sank the last Ger. gunboat on the lake. In March 1921 the district of U. together with part of Bukoba, previously administered by the Belgians, were transferred to

British jurisdiction. The oil palm is cultivated in the neighbourhood.

Ukraine, The. One of the constituent republics of Union of Socialist Soviet Republics. It is an independent republic federated with the gov. of Russia. At one time the U. was a part of Poland. The name U. was first applied to the Tatar frontiers of Poland, and later to the dist. about the middle Dnieper. In the eighteenth century, the portion E. of the Dnieper passed to Russia, and formed 'Little Russia.' At the second partition of Poland (1793) the W. portion also passed to Russia. For events in the U. during the Great War, see under WAR, THE GREAT. The U. Republic was formed after the Russian revolution of Nov. 1917 (see RUSSIA—*Russian Revolution*). In 1920 the Ukraine Republic concluded a military and economic alliance with the Russian Socialist Federal Soviet Republic, and a number of People's Commissariats were formed for military and naval affairs, finance, foreign trade, labour, transport, etc. In 1923 the U.S.S.R., together with other Soviet republics in Russia, formed the Union of Socialist Soviet Republics. The U. consists of the former govts. of Chernigov, Kharkov, Kiev, and Poltava, together with Ekaterinoslav (Dnepropetrovsk) and Kherson in 'South Russia' and Volhynia and Godolia in 'West Russia,' the total area being 171,201 sq. m. (including the autonomous Moldavian Republic). The U. is essentially the cereal-growing region of Russia, and is very fertile, lying in the S. and watered by the Dnieper, Bug, and tributaries. Agriculture is the chief industry. Before the Great War the harvests exceeded one billion poods, but, during the revolution and after, production declined by nearly 75 per cent.; in 1924 it had risen to over 700 million poods, and the production is still increasing. In 1925 there were 5 million peasant farms. There are also numerous Soviet farms and agricultural experimental institutions. The chief crops are wheat, rye, oats, beet, tobacco, corn and potatoes. The sugar-beet factories produce some 10 million poods of sugar annually. Large numbers of horses, cattle and pigs are raised. There are considerable deposits of iron ore and coal, and of quicksilver. The industries are amongst the most important in Russia. Most of the coal, manganese ore and sugar of Russia comes from U., and a considerable percentage of the pig iron, steel, and agricultural machinery; while the U. is the chief source of the European

supply of quicksilver. The chief tn and seat of gov. is Kharkov (*q.v.*) other tns. are Odessa (*q.v.*), Kiev (*q.v.*), Ekaterinoslav (*q.v.*), Nikolaiev, Taganrog and Poltava. Pop. is about 29,000,000.

Consult B. Sands, *The Ukraine*, 1914; I. Shafarenko, *The Natural Resources of the Ukraine*, 1920; P. Stebnitsky, *L'Ukraine et les Ukrainiens*, 1919; Stavchenko, *The Organisation of the National Economy of the Ukraine*, 6 vols. (Ukraine State Publishing Company), 1926.

Ulcer, a gradual destruction of tissue as a consequence of infection or injury. The difference between ulceration and gangrene is that, in the former, the disintegrated tissues are cast off in liquid form as a discharge, while in gangrene visible portions of tissue are detached. In most cases, an U. is a healing process by which diseased tissue is gradually dissolved in an 'ichor,' while the area of the sore diminishes, a scar or cicatrix taking the place of the ulcerated surface. In some cases the toxic element is too powerful for the normal healing process, and the U. tends to spread, the discharge being infectious. The best treatment is dressing with an antiseptic such as boric acid. Caustics and astringents such as silver nitrate are often useful. As ulceration is frequently accompanied by an enfeebled state of the system, the administration of a general tonic is to be recommended.

Uleaborg (Finnish *Oulu*): (1) The northernmost län or prov. of Finland. Area 65,263 sq. m. It consists of the plateau (1000–1200 ft.) of Lapponia, the fertile lowlands of Osterbotten on the Gulf of Bothnia, and the plateaus (1500–1640 ft.) of Saomanselka and Kajana. Pop. (1928) 414,358. (2) Chief tn. of above; a seaport at mouth of R. Ulea in Gulf of Bothnia, with trade in wood, tar, and pitch. Pop. (1928) 23,478.

Ulema, the collective name of the Muslim theological jurists who derive their decisions from the Koran and its commentaries. The name was especially applied to the religious hierarchy of the old Turkish Empire, with the Sheikh ul Islam at their head. They formerly enjoyed many privileges, being exempt from taxes and from the more severe legal penalties except banishment. The name is also given to councils of men learned in Moslem sacred law, and holding official posts. See also **SUFISM**.

Ulex, an important genus of Leguminosæ, found in W. Europe and N. Africa. Three species occur in Britain, and are known popularly as the gorse, furze, or whin.

Uifilas, Ulphilas, Wulfilas ('little

wolf") (c. 311-385), the celebrated translator of the Bible into Gothic. Consecrated bishop in 348 he was expelled by his heathen compatriots from his native place, and sought refuge in Lower Moesia, where he remained for thirty years. In 385 he went to Constantinople (whither he had gone once before in 360 to assist at a council), and d. there shortly afterwards. He was one of the chief lights of Arianism. His greatest work, however, is his Gothic translation of the Bible, a work by which he contrived both to fix the Gothic language and to perpetuate Christianity among the Gothic people. On the contention that the Bible of U. is 'now proved to be no Bible of Ulphilas at all,' see article by H. Belloc in the *New Statesman*, Oct. 8, 1921.

Ulianovsk, a tn. of S.E. Russia, in the Central Volga Area, formerly known as Simbirsk. It stands on a hill on the right bank of the Volga and is connected by rly. with Moscow and Siberia. Fishing is carried on, and the city has a lively trade, chiefly in grain. It has textile factories. Pop. 70,194.

Ullswater, the second largest lake in England, between Westmorland and Cumberland, 8 m. long by $\frac{1}{2}$ m. broad and 210 ft. deep. Aira Force (80 ft.) falls on the W. side, and U. also receives the Patterdale Beck.

Ullswater, James William Lowther, first Viscount, b. April 1, 1855, son of Hon. William Lowther, who was 25 years M.P. for Westmorland. Educated at Eton, King's College, London, and Trinity College, Cambridge. Called to the Bar in 1879 and in 1883 was returned to parliament as a Conservative for Rutland. Represented the Penrith division of Cumberland, 1886-1921. In 1891 he was Under-Secretary for Foreign Affairs; in 1895 Chairman of Ways and Means and Deputy-Speaker; and in 1905, on the retirement of Mr. Gully, he was elected Speaker to the House of Commons. Resigned, and raised to peerage, 1921. Has since been chairman of several important conferences and commissions. Wrote *A Speaker's Commentaries*, 1925.

Ulm, a fortress and riv. port of Württemberg, Germany, in the circle of the Danube and on its left bank at its confluence with the Blau. It is connected by bridges with Neu-Ulm, in Bavaria. It is included in the fortress dist. of Mainz and serves as a permanent camp. It contains the largest Protestant church in Germany and has manufactures of hats, tobacco, pipe-bowls, machinery, instruments, and textiles. Pop. 59,350.

Ulmus, see ELM.

Ulphilas, see ULFILAS.

Ulpian, or Domitius Ulpianus, a Rom. jurist of the second and third centuries A.D., b. at Tyre. He was assessor in the auditorium of Papinian under Septimius Severus; associate justice under him and Caracalla, and adviser and prætorian prefect to Alexander Severus. He wrote many works, extracts from which form a large part of Justinian's *Digest*.

Ulrich von Hutten, see HUTTEN, ULRICH VON.

Ulrich, Hermann (1806-84), a Ger. philosopher, b. at Pforten; educated for the law at Halle and Berlin. In 1834 he became professor of philosophy at Halle, and remained there till his death. His works include: *Geschichte der Hellenischen Dichtkunst*, 1835; *Über Princip und Methode der Hegelschen Philosophie*, 1841; *Das Grundprincip der Philosophie*, 1845-46.

Ulster, the northernmost of the four great divisions of Ireland, bounded by the Atlantic Ocean, North Channel, Irish Sea, Leinster, and Connaught. It was one of the most anct. divisions of Ireland, and was the seat of the O'Neills. The N.E. part was for long a seat of Eng. power in the N., but until the Plantation of U. in the reign of James I. no permanent settlement was made in the rest of U. Emigration has always been a drain on the pop. of the prov., which decreased from 1,914,236 in 1891 to 1,582,325 in 1901. Nevertheless, the prov. is prosperous, flax-spinning being the most important industry next to agriculture. Iron and salt are worked in Antrim, and stone and various kinds of clay for bricks, etc., in other parts. The prov. is divided into Belfast and Londonderry co. bors. and the cos. of Antrim, Armagh, Down, Fermanagh, Londonderry, and Tyrone, which together form Northern Ireland (pop. 1926, 1,256,561); and Cavan, Donegal, and Monaghan which are included in the Irish Free State, the pops. (1926) being 82,452; 152,508; 65,131 respectively. See separate articles on the counties, also IRELAND, NORTHERN.

Ultramarine, the name given to a substance of a fine blue colour, originally obtained by grinding lapis lazuli. It is now prepared artificially by heating Glauber's salt or soda with kaolin, charcoal, and sulphur, at first with exclusion of air. The dull green product is converted into the blue compound by heating with sulphur with access of air. The U. is made ready for use by washing and levigating. It is stable to light and air, but is decomposed even by weak acids. Aluminium, silicon, sodium, and sulphur are its chief constituents, but its exact constitution is not clear.

It is used as a pigment for colouring papers and in laundry work. Various shades of U. may be obtained by slightly varying the proportions of the ingredients, and by treating blue U. with hydrochloric acid, ammonium chloride, etc.

Ultramontane ('beyond the mountains,' i.e. the Alps), a term applied to Italy by countries N. of the Alps and transferred to the Italian party in the Rom. Catholic Church, who attach great weight to papal supremacy.

Ultra-violet Light, invisible to the naked eye, but rendered perceptible by the fluorescence it causes when allowed to fall upon a screen coated with certain substances (e.g. impure calcium sulphide, barium platino-cyanide, anthracene), consists of light-waves of shorter wave-length than those of the visible violet. They range from about 4000 to 2000 Ångström units (i.e. 4×10^{-5} to 2×10^{-5} cm.). Physiologically they are extremely powerful, producing sunburn and causing the formation of the anti-rachitic vitamine D. They are strongly germicidal and, employed under suitable precautions, are very valuable therapeutically. They reach the earth in quantity from the sun, though much U. L. is cut off by a stratum of ozone in the upper atmosphere; and they may be produced artificially by mercury-vapour lamps and arc lamps. Treatment of children suffering from rickets by exposing them to U. L. has proved strikingly successful, while to the healthy person U. L. may act as a general tonic, especially if applied under such ideal conditions as a sunny holiday at winter sports in the mountains of Switzerland.

Ultra Vires (Lat. 'beyond one's strength or power'), a legal phrase used particularly with regard to the limitation of the legal or constitutional powers of a person, court, company, or corporation. In company law anything done by a company outside the powers given in the Memorandum of Association (see COMPANY) is U. V. and void; nor can the company make it valid, even if every member assents to it, because the rule is framed for the protection of future shareholders and the public at large who may have dealings with the company. Acts, however, beyond the powers of the *directors* only may be ratified by the shareholders; and acts U. V. the *Articles of Association* can be indirectly cured by simply altering the articles in the proper manner.

Ulundi, a vil. in Zululand, Natal, the scene of several battles between the Zulus and the British. U. was the royal kraal of the Zulu kings.

Ulverston, a market tn. of Lancashire, England, in the Furness dist., is connected by a ship-canal with the estuary of the Leven, and has a large export trade. It is in a mining dist., and has foundries and iron works. Pop. (1931) 9235.

Ulysses, **Ulyxes**, or **Ulixes**, the name under which the Gk. hero, Odysseus, was known among the Romans. U., who is the hero of Homer's *Odyssey*, was the son of Laertes and Anticleia (or, according to later tradition, of Sisyphus and Anticleia), King of Ithaca, husband of Penelope, and father of Telemachus. The story of U., as related by Homer, has been much extended and modified by later poets and mythographers. By Homer he is represented as the model of a prudent warrior, as a man of acuteness, and always ready to devise means of avoiding or escaping from difficulties, as superior to all men in intelligence, in wisdom equal to the gods themselves, and in adversity courageous. Later poets sometimes represent him in a different light, as cunning, false, and mean. When the Gk. chiefs had resolved upon their expedition against Troy, Agamemnon prevailed upon U. to join them, but it was with great difficulty he was induced to assist in the enterprise. During the war against Troy he acted a prominent part as a gallant warrior and as a bold and cunning spy. Some say he devised the stratagem of the wooden horse. After the destruction of the city his wanderings and sufferings began, which form the theme of the *Odyssey*.

Uma, or **Pārvati**, in Hindu mythology, the consort of Siva. She is also known as Kālī (the black one), Durgā (the inaccessible), and Mahadevī, and her worship is widespread.

Umballa, or **Ambala**, a city, cap. of Umballa dist., Punjab, India, 39 m. S. of Kalka; is an important railway junction and military cantonment. Pop. (1921) 76,326. The dist. has an area of 1851 sq. m. and a pop. of 800,000.

Umbelliferae, an important and widespread family of Dicotyledons, contains about 1600 species. The flowers are characterised by their five free sepals and petals (often minute), five free stamens, and the inferior bilocular ovary formed from two carpels. The stalks of the flowers all spring from the top of the main stalk, so as generally to produce a flat flowerhead. Some of the chief genera are *Carum*, *Eryngium*, *Apium*, *Daucus*, and *Cicuta*.

Umbur, a natural pigment, containing hydrated oxides of iron and manganese. The earthy pigment is

washed and dried at 212° F. It then constitutes 'raw umber' which, calcined, becomes a rich brown colour—'burnt umber.'

Umbilical Cord, see FETUS.

Umbrella (Lat. *umbra*, shade), a portable protection from the sun or rain, is of great antiquity. Its use was known in China as early as the eleventh century B.C., and anct. sculptures of it have been discovered in Nineveh, Persepolis, and Thebes (Egypt). In the East the U. was an emblem of rank. In anct. Greece and Rome U.s. were regarded as effeminate and seldom used by men, but in the twelfth century the Doge of Venice had an U. with the ceremonial significance of a canopy. In Eng. literature reference is made to the U. by Drayton (1620), Swift (*City Showerers*, 1710), and Gay (*Trivia*, 1716). In the reign of Anne it was only used by women, the first man to carry it being Jonas Hanway (1712-86), a Persian explorer. U.s. with steel ribs, instead of the hitherto cumbersome cane, were first made about 1840. The manufacture of U.s. is chiefly carried on in London, Glasgow, Manchester, Paris, and Lyons.

Umbrella Bird, or *Cephalopterus ornatus*, a species of Cotingidæ, which is peculiar on account of a large umbrella-shaped crest on its head. The bird itself is of a uniform black plumage.

Umbrella Tree, the name given for an obvious reason to many plants, notably to *Magnolia Fraseri*, *Paritium Guineense*, and a species of *Acacia*.

Umbria, an anct. div. of Italy, lying between Etruria on the W., the Sabine territory on the S., Picenum on the E., and the Ager Gallicus on the N. The original territory of the Umbrians was continually plundered in the sixth century B.C. by Gallic and Etruscan invaders, so that they were restricted to the upland tracts of the Apennines. They joined the Samnites against Rome, but were subdued at Narnia (295). See Bücheler's *Umbria*, 1883, and Hutton's *Cities of Umbria*, 1905.

Umeå, a seaport of Sweden, cap. of Westerbotten co., near the mouth of the Umeå R., in the Gulf of Bothnia, 95 m. N.E. of Hernösand. Pop. (1929) 10,683.

Umpire, see ARBITRATION; CRICKET.

Umrtsar, see AMRITSAR.

Umtali, a tn. on the E. border of Southern Rhodesia. It has railway works and is a centre of the gold trade.

Unalaska, see ALEUTIAN ISLANDS.

Unamuno, Miguel de, Span. author; b. Sept. 29, 1864, at Bilbao. From 1879 studied philosophy and letters at Madrid—doctor, 1883. Professor of

Gk., Salamanca, from 1892. Exiled, April 1924, for political utterances; refused offered amnesty, went to Paris. Elected to National Assembly, Oct. 1929. Returned from exile, Feb. 1930. Works include: Novels: *Paz en la Guerra*, 1897; *Niebla* (Mist), 1914; *Abel Sanchez*, 1917; *La Tia Tula*, 1921. Poetry: *El Cristo de Velásquez*, 1920. Essays: *Vida de Don Quijote y Sancho*, 1905; *Recuerdos de Niñez y de Mocedad*, 1903; *Del Sentimiento Trágico de la Vida*, 1913.

Unao, a tn. and dist. in the Lucknow div. of the United Provinces, India. The tn. is 10 m. N.E. of Cawnpore. Pop. 11,800. The dist. has an area of 1787 sq. m. and a pop. of 911,000.

Unconformity. Where an overlying series of rocks rests upon the eroded edges of an older series, usually having a different dip, the beds are said to be unconformable, and the appearance is termed U.

Unconsciousness, the condition in which no perceptions are made. As it is difficult to define consciousness, so is it difficult to define its opposite, but in common speech the state of U. implies a suspension of the ordinary mental phenomena of consciousness; the mind is a blank for the time being, as in sleep, coma, fainting, etc. The immediate cause of U. is a disturbance of the cerebral circulation, either by congestion, as in coma, diminution of blood, as in syncope, or poisoning, as during anaesthesia, etc. Normal individuals become habitually unconscious periodically by the phenomenon of sleep (q.r.). It is well established that the brain is more or less drained of blood during sleep, but the exact manner in which the mechanism works is not known. It is certain, however, that cessation of activity is essential for the well-being of the higher nervous centres, and although the limbs and other parts are normally quiescent during sleep, the state of U. is necessary primarily for the recuperation of the specific nervous agencies. It is doubtful if we can speak of any state of U. as complete; even the blankest of mental states does not appear to be wholly devoid of consciousness while there are gradations running from a sound sleep through dreamy conditions to the most alert state of general attention that we are capable of. Even intensity of attention is accompanied by a withdrawal of attention from subjects away from the focus of consciousness, so that a person may be said, even when most determinedly awake, to be 'unconscious' of many things. See HYPNOTISM.

Uction, *see* EXTREME UNCTION.

Undercliff, The, a succession of cliffs and terraces sloping towards the sea on the S. coast of the Isle of Wight, and extending from Dunnose past Ventnor to Blackgang Chine, which seem to have been formed by landslips. The dist. extends for about 7 m., and is from $\frac{1}{2}$ m. to $\frac{3}{4}$ m. in width.

Underground Dwellings are prehistoric and belong originally to the Stone Age. Their distribution from China, Korea, and Japan, along the northern stretch of the Old World to Scandinavia; their presence in Iceland, Greenland, N. America, and the Aleutian Isles, in all of which places they are yet found in use; and their occurrence in a belt further S., probably points to a connection between them and the rigorous climate gradually receding northwards from the great ice age. They occur in many forms, gradually passing into that of mound dwellings (*q.v.*). In Scotland they are numerous in the upper valley of the R. Don, being known as *erd-houses*, *Picts' houses*, or *weems*, and evidently forming villages. They are supported by masonry of the simple, massive, Cyclopean kind, with no mortar, carvings, inscriptions, or marks of tools. The cave of Raitts in Inverness-shire has the form of a horse-shoe with one limb truncated, and is about 70 ft. long, 8 ft. broad, and 7 ft. high. The side walls converge upwards and are covered with large slabs. At Pitcur in Forfarshire, there is an U. D. nearly 70 yds. long, entered by means of ladders or notched poles, which could hardly have been intended for defence. Such U. Ds. may have been used in remote places as normal residences, or probably more often as places of concealment to which the inhabitants might retire when threatened by attack.

Underground Electric Railway Company of London, Ltd., registered in 1902, when it absorbed the Metropolitan District Electric Traction Company (registered in 1901 to electrify the Metropolitan District Railway). The company constructed the Charing Cross, Euston and Hampstead, Great Northern, Piccadilly and Brompton, and Baker Street and Waterloo Railways, which were all amalgamated as from July 1910 as the London Electric Railway Company. In 1912 the company acquired the control of the London General Omnibus Company and of the City and South London Railway Company and, in 1913, the undertaking of the New Central Omnibus Company. Under an Act of 1915 the City and

South London, Central London, London Electric and Metropolitan District Railway Companies and then London General Omnibus Company—in all of which the U.E.R.C. of L. is largely interested—entered into a pooling agreement, the details of which appear in the notices of the several companies. The authorised share capital of the U.E.R.C. of L. is £11,300,000, issued and paid-up £10,700,990. *See also* LONDON.—*Traffic*.

Underground Railroad, a secret system formed in the Northern States of America before the Civil War in order to assist fugitive slaves to reach Canada, where they were safe from recapture. Guidance, shelter, food, and clothing were provided by the sympathisers.

Under-sheriff, *see* SHERIFF.

Understanding, in philosophy, a term used in two somewhat different senses. By the older Eng. philosophical writers, such as Locke and Hume, it is used to denote the human mind in general, and the human intellect in particular, in opposition to the faculties of emotion and volition. It is now more used in the sense given it by Kant and developed by Hegel. In this sense U. is the lower faculty of the mind which deals with phenomena, while reason is the higher faculty dealing with noumena or universals.

Underwood. In law, saleable U., as opposed to timber trees intended for permanent growth, may be defined as 'woods consisting of oak, ash, or elm, which are universally timber trees, or of beech, which may be timber by custom, or willow, the stools of which can be and are so treated as to produce a succession of saleable crops.' In less judicial language U. is small trees or shrubs growing amongst larger trees. A tenant for life or for a term of years is entitled to cut and make use of U., if ripe for cutting, but may be restrained from improper cutting or from cutting from saplings.

Underwriter, *see* INSURANCE.

Undeveloped Land Duty, *see* LAND TAXES.

Undines, the name given in the fanciful system of the Paracelsists to the elementary spirits of the water. They are of the female sex. Among all the different orders of elemental spirits they intermarry most readily with human beings, and the U. who gives birth to a child under such a union receives with her babe a human soul. But the man who takes an U. to wife must be careful not to go on the water with her, or at least not to anger her while there, for in that case she will return to her original element.

Baron de la Motte Fouqué has made this Paracelsist fancy the basis of an exquisite tale, entitled *Undine*.

Undset, Sigrid, Norwegian novelist, b. 1882, at Kallundborg, Denmark, May 20. Educated at Christiania (Oslo) Mercantile College, afterwards working as a clerk. Her first success was with the novel *Jenny* (1912; Eng. trans. 1927) in which she wrote as the champion of family life against the dull, cheerless existence of a business career. Became a Rom. Catholic after the Great War, and wrote a strong historical novel, *Kristin Lavransdatter* (Eng. trans. 1930). Awarded Nobel Prize in 1928. Other novels trans. in Eng. are *The Cross*, 1927; *The Axe*, 1928; *The Snake Pit*, 1929; *The Son Avenger*, 1930.

Undue Influence. In law, a contract to which a party has been induced to give his consent by the exercise of U. I. on the part of another is voidable. So also a will can be attacked by interested parties on the same ground. Presumptions of U. I. arise generally in connection with gifts. It is entirely a question of fact whether in any particular case U. I. was used. The law will not presume U. I. until it is first proved that the relationship between the parties was or is such that one of them was likely to be able to exercise his influence over the other, and then it is open to the defendant to rebut the inference from such relationship. The relations of solicitor and client, parent and child, guardian and ward, trustee and beneficiary are all presumed to give the former, in each case, influence over the latter. But the strength of the presumption depends entirely on the intimacy of the relationship, e.g. that of a doctor and his patient is in most cases not nearly so close as that of a guardian and ward. U. I. is not in any way a doctrine specially connected with defective will power, though such fact, if present, may be a strong element for the consideration of judge or jury.

Undulatory Theory, see INTERFERENCE, LIGHT, OPTICS, etc.

Unemployment. It is only within recent years that anything like a scientific attempt has been made by the state to grapple with the problem of U. So far as skilled labour is concerned, the removal in the course of the last century of most legislative restrictions on trade unions left those institutions free to go beyond their primary purpose of providing benefits to distressed members and to organise specialised classes of labour in such a way as to mitigate the evils of U. in such classes. From the reign of Queen Elizabeth, when the vagrant or vagabond class had increased so

as to require legislative attention, the only remedy the state had to offer was the Poor Law system, and in extending out-door relief the policy of the Poor Law ignored all distinctions between the destitute through trade depression and the congenital loafer or 'unemployable.' The recognition of the differences between the class of unemployed who are of good character and can show good industrial records, the aged, infirm, or inefficient unemployed, and the morally defective unemployed, has at least resulted in an endeavour to meet these different classes with different remedies. The principal modern means of diminishing U., whether abroad or in England, before the Great War were: (1) Labour Exchanges, which in England grew out of the previously existing system of local distress committees (see EMPLOYMENT EXCHANGES). (2) Labour Colonies. These institutions are fully dealt with under LABOUR COLONIES; it is only necessary to say here that they are mostly in the nature of penal or reformatory institutions, and exist rather to decasualise unskilled labour by the supply of more or less unremunerative work than to give work to the fit (see also BOSTAL; PREVENTION OF CRIME). (3) Insurance, compulsory and voluntary state insurance against U. But a compulsory insurance scheme had existed for some years in Germany prior to the passing of the National Insurance Act of 1911 in England. A voluntary system was tried in Cologne and Leipzig thirty years ago, but it was soon found that the amount expended on benefits far exceeded the revenue from contributions. Profiting by this lesson some of the Swiss cantons inaugurated compulsory schemes, though with very varying degrees of success. In France attempts were made to work a system of subsidisation under state direction of trade union unemployed insurance. As to the provisions of the National Insurance Act, 1911, which was followed by some sixteen further Acts up to 1931, relative to U. insurance, see under NATIONAL INSURANCE.

In the U.S.A. steps are being taken by all public bodies to obviate U. which up to 1920 had not been so acute as in the United Kingdom. In certain states there are official public employment bureaus, and many others have enacted legislation for the establishment of U. insurance schemes.

Within the last decade, however, U. has assumed the importance of an acute world-problem, and it is no longer sufficient to carry out schemes

of relief-work by public bodies. International experts are agreed that the problem is of too vital a nature to be solved by emergency measures. Professor Henry Clay and Professor W. H. Beveridge are among those who have contributed analytical studies of the question (see bibliography at the end of this article). According to these authorities the chief causes of the widespread U. to-day are (1) disorganisation of the labour market; (2) seasonal fluctuations in various trades according to the rise and fall of public demand; (3) loss of industrial quality owing to deficiencies of training of youthful labour and the interruption of preparation for careers caused by the Great War; (4) growth of industries in abnormal proportion, for example, those which served War purposes, such as engineering, iron and steel works, together with a restriction of such trades as building, printing, and furnishing; (5) a surplus of available labour, together with a surplus of manufactured goods, and (6) under-consumption. Other contributory causes include excessive wages, in which connection Professor Pigou states that high wages, to be justified, must necessarily be accompanied by greater production and cheapening of capital. Tariffs, too, are theoretically a potential cause of U. where they lead to restricted markets. The question whether over-pop. is one of the causes of U. is not yet solved. The study involves intricate scientific inquiry, and, while many theories are put forward claiming that the world is over-populated, until a complete statement, yet unavailable, of the resources of the world is made, no dogmatic pronouncement can be supported either by history or economics.

In Great Britain remedies for U. before the War included the institution of Labour Exchanges (see under EMPLOYMENT EXCHANGES), an attempt to organise the labour market, insurance against U., and the stabilisation of the demand for labour. These measures are inadequate to meet existing conditions. Employment Exchanges are hampered in their usefulness by the tendency on the part of employers to use them to supply emergency labour rather than normal requirements; insurance has become little more than a scheme of relief and the committee set up in 1909 to give equilibrium to the demand for labour was dissolved in 1914. Suggestions now being considered by the Royal Commission on U. as pub. in their interim report of June 1931 include the proposal that the

Ministry of Labour should have power to schedule any industry suffering from excessive U. so as to secure that: (1) all engagements of workpeople should be made through an Employment Exchange, and that (2) funds involved in meeting excessive U. should be raised by a special levy on the industry through the employer to encourage him to organise his industry with a minimum of variation in the numbers of his workpeople. Other proposals involve a considerable expenditure of public money upon public works, construction of roads, bridges, and the like. But there are critics of the suggestion who, with Mr. Winston Churchill, point out that little actual additional employment can be created by state borrowing. Authorities such as Mr. J. M. Keynes and Mr. H. D. Henderson, however, argue that public expenditure can be justified if it leads to creation of increased bank-credit, and to imports of capital from abroad, and if it diminishes the export of capital in the form of gold. An elaborate scheme on such lines was put forward in the Liberal election manifesto of 1929. It is admitted that such a programme would do little more than relieve U. The cure of the disease probably lies in drastic reorganisation of industrial methods and customs.

Statistics.—The increase of U. in the United Kingdom is shown in the following table; the figure for 1913, quoted to-day as a 'normal' figure, was nearly 500,000.

Date.	No. of Insured Unemployed.
Dec. 1926 . . .	1,495,839
" 1927 . . .	1,336,303
" 1928 . . .	1,452,619
" 1929 . . .	1,478,771
July 1930 . . .	2,011,467
Dec. 1930 . . .	2,643,127
Jan. 1931 . . .	2,595,000
April 1931 . . .	2,550,000
July 1931 . . .	2,713,350
Feb. 1932 . . .	2,701,000
Mar. 1932 . . .	2,567,332

Industries with high U. percentages were as follows (Feb. 1932):

Industry.	Percentage of Insured Unemployed.
Shipbuilding and Repairing	60
Steel and Iron . . .	47
Seamen . . .	34
Dock, Canal, River and Harbour Services	33
Building . . .	32
Engineering . . .	27
Coal-mining . . .	28
Cotton . . .	26
Woollen and worsted . . .	16

The percentage of unemployed according to areas (Feb. 1932) is shown by the following table :

Area.	Percentage.
London.	14.7
South-Eastern	16.2
South-Western	18.0
Midlands	19.7
North-Eastern	26.7
North-Western	25.4
Scotland	27.5
Wales	34.9
N. Ireland	25.0
Special Schemes	3.8
Total	22.0

The figures for the southern area are lower than those of the N., due partly to the growing industrialism of the S.

Unemployment in other countries is indicated as follows :

In the U.S.A., according to the estimate of the Federation of Labour

France not more than 330,000 unemployed appear on the official register, but about seven millions are on short time, representing 56 per cent. of the trade union totals. In Australia the percentage of unemployed is 28, while the number of unemployed in New Zealand approaches 48,000. U. relief is granted by the gov., but work must be performed in return for it.

The International Labour Office of the League of Nations has reviewed the world-wide U. situation and among the recommendations of the Geneva U. Committee of Feb. 1931 a scheme of international exchange of workers was discussed.

Consult W. H. Beveridge, *Unemployment, a Problem of Industry*, 1930; Report of Liberal Industrial Inquiry, *Britain's Industrial Future*, 1923; Pigou, 'Wage Policy and Unemployment,' *Economic Journal*,



UNICORNS IN A CARVED OAK CHIMNEY-PIECE

(French—early sixteenth century)

pub. in Jan. 1931, 8,000,000 persons were unemployed, though registration in that country is less complete than in Great Britain. A memorial appealed to the President to call a special Congress in order to meet the emergency with the undertaking of public works and the granting of Federal assistance to establish a general state insurance scheme, while the Governor of New York proposed to the State Legislature that it should increase income tax to provide funds for U. relief. The suggestions were not accepted and with the exhaustion of charitable funds an acute situation has developed. It is estimated that £18,000,000 has been spent in relief. In Germany the number of unemployed in Jan. 1932 reached the total of 6,100,000. The situation is aggravated by Germany's peculiar impoverishment owing to her reparations payments (see REPARATIONS). During 1931 she was forced to reduce the scale of U. benefit from state U. insurance. In

Sept. 1927; *Labour Year Book*, 1931; R. C. Davison, *The Unemployed*, 1929; Henry Clay, *The Post-War Unemployment Problem*, 1930; Sir Norman Angell, *Can Governments Cure Unemployment?*, 1931.

Ungava, a former dist. of Labrador, Canada, occupying all the interior of the peninsula now known as the Territory of U. It was annexed to Quebec in 1912 under the Quebec Boundaries Extension Act. Area 351,780 sq. m. It contains numerous lakes and is watered by many small rivs. It is now absorbed in Ontario. Fort Chimo is the chief port.

Unger, Franz (1800-70), an Austrian botanist and geologist, b. in Styria. He was appointed professor of botany at Gratz (1836) and at Vienna (1850). He pub.: *Anatomie und Physiologie der Pflanzen*, 1855, and *Geologie der europäischen Waldbaume*, 1869.

Unguent, see OINTMENT.

Ungulata, a large order of hoofed mammals, including the Ruminantia

and Pachydermata of Cuvier. The feet are never plantigrade and the toes are never clawed, and number more than four only in the elephants (Proboscidea).

Unicorn (Lat. *unus*, one; *cornus*, horn), a fabulous animal referred to by Gk. and Latin writers. It was said to be a native of India, resembling a horse in shape and size, and having one straight horn 1½ cubits long on its forehead. The figure is used in heraldry (see p. 313). See O. Shepard, *The Lore of the Unicorn*, 1930.

Uniform : MILITARY.—Originally, since regiments were usually raised almost as mercenary bands through the colonel of the regiment, the garb of the units of that regiment was decided by its commanding officer. No regularity was observed, and the choice of garb depended entirely upon the taste of the officer commanding. The regiments raised for the service of the king wore naturally the livery of the king; in England this was scarlet, and so in the course of time all regiments came to wear a scarlet livery, and to determine their origin only by a differentiation of the facings which they wore, such facings being generally the colour of the livery of the officer who raised them. The royal regiments, such as the household troops, wore the blue facings of the royal house. Gradually it came to be customary for all regiments of the same arm to approach more closely to one another in the matter of U. Hence we find during the Stuart and Georgian periods great changes being made in such direction, so that it became possible to call the costume of each regiment a U. The original Stuart cavalier hat passed first of all into the three-cornered hat that distinguished Marlborough's troops, and next into the cocked hat of the middle Georgian period. During the whole of this period the soldiers wore the knee breeches which for so long were the usual dress of the civilian. The short coat which had been universal in all branches of the service was replaced by the tunic in all regiments save the Highland and the Royal Artillery. The unserviceability of the army clothes was shown drastically during the Crimean War, and the Indian Mutiny again proved the need for something lighter and more suitable for soldiers on foreign service. During the S. African War the troops were clad in khaki, and this has now been adopted as the service dress for all, or practically all, troops. Some of our troops have borrowed the models of their dress from abroad. The hussars have the Hungarian dress, and wear

a busby which has now developed into a huge fur-covered hat with a strip of cloth stitched to the side. The lancers' U. is modelled on that of the Polish Uhlans. The cuirass was adopted by the dragoons and the household cavalry. The infantry head-dress has undergone many changes; the cocked hat gave place to the shako, and this, in the course of time, to the cloth, spiked helmet. The service-dress cap is practically universal, an outstanding exception being the beret of the Royal Tank Corps. Towards the end of last century all royal regiments wore blue facings, all non-royal regiments white facings if Eng. or Welsh, yellow if Scottish, and green if Irish. Later, this was altered, and the regiments wore the facings which they held previous to 1881. In service dress regiments are distinguishable by their badges and, in addition, officers serving on the staff are distinguishable by coloured arm-bands or brassards. In hot climates khaki drill is worn with suitable helmets. Pre-war full dress uniforms, except for the Guards regiments, have not yet been reintroduced and, apart from the question of expense, probably public opinion is opposed to reintroduction.

In the U.S.A. by an Act of 1902, several alterations were made in the army U.; all U. except overcoats and service dress were to be of dark blue with facings red, yellow, and white, the overcoat of a yellowish-brown colour and the service dress of a drab colour. The chapeau was discarded save for rare occasions. The service dress of the U.S.A. army is olive drab in colour and the material used in making it is in accordance with the climate in which the troops are serving. Full dress has not yet been generally introduced owing to cost.

Military Badges.—These denote rank in the case of officers, and are then worn either on the shoulder, collar, or sleeve, and in the case of non-commissioned men proficiency in some special branch, and are then worn on the sleeve. Eng. officers' badges are: second-lieutenant, one star; lieutenant, two stars; captain, three stars; major, crown; lieutenant-colonel, crown and one star; colonel, crown and two stars; brigadier-general, sword and baton; major-general, sword and baton and one star; lieutenant-general, sword and baton, crown, and two stars; general, sword and baton, crown, and three stars; field-marshal, crossed batons in a wreath of laurel and crown. Proficiency badges are denoted by: colour-sergeant, crossed colours;

pioneer, crossed axes; farrier, spur; signaller, crossed flags; marksman, crossed rifles; wheelwright, a wheel.

In the U.S.A. officers' badges are as follows: major-general, two silver stars; brigadier-general, one silver star; colonel, one silver star; colonel, one silver spread eagle; lieutenant-colonel, one silver leaf; major, one gold leaf; captain, two silver bars; first lieutenant, one silver bar.

NAVAL.—No uniformity of dress can be said to have appeared in the Eng. navy until about the year 1660. The Tudor livery of green was worn during the Tudor period and replaced by a scarlet livery under the Stuarts. The first attempt to obtain any uniformity was due to the official designation of the clothes which were stocked in the slop chest. In the seventeenth and eighteenth centuries the seamen wore usually kilt, trousers, a pea-jacket, and small cocked hat. These cocked hats were replaced by soft hats towards the end of the eighteenth century, and about the same time an attempt was made to introduce a U. for officers. The sailor collar which is worn at the present time dates its origin from the time when sailors wore 'pig-tails,' and was worn to prevent the hair soiling the uniform. During the revolutionary wars sailors wore a blue jacket and white trousers. By the middle of the nineteenth century both officers' and men's U.s. were fixed very much as they are at the present time. The present monkey jacket replaced the blue tunic about 1889. On shore for certain occasions leggings are worn by all ranks. A white uniform is worn in the tropics. The U.s. in the U.S. navy are very similar to the British naval U.

Naval Badges.—The term badge is applied in the navy only to the distinctive signs worn by the men and boys. The distinctive marks of the varying grades of officers are not technically called badges, although the term is often commonly applied. Naval badges are worn as signs of good conduct, special qualifications, and rank. An Eng. first-class petty officer wears crossed anchors surmounted by a crown; a second-class petty officer, an anchor surmounted by a crown; a chief seaman, an anchor. On the left arm good-conduct badges are worn. Badges denoting special qualifications are worn on the right arm; chief among them are: a signalman, crossed flags; a marksman, usually crossed rifles; a stoker, a propeller; armourers, a gun and crossed axe and hammer; blacksmiths and wheelwrights, crossed axe and hammer; a torpedo-man, a crossed gun and torpedo. Chief petty officers are known

by the distinctive buttons which they wear, as also are engineer artificers.

AIR FORCE.—A full dress of blue material has been approved, but it is not universally compulsory. For service dress a uniform of Baratheia cloth is worn. On foreign service in hot climates khaki drill and helmets are worn.

Uniformity, Acts of, a series of Acts passed by parliament for the regularising of public worship in England. The Act of 1559 imposed the Prayer Book on the whole kingdom, and required all persons to attend their parish church. The best-known Act, however, is that of 1662. This required the new Prayer Book to be used in all churches and places of worship throughout the kingdom. For their refusal to conform to this regulation, a large number of ministers who had been inducted into benefices during the Commonwealth period were compelled to give up their posts. The 1872 Act authorised certain shortened forms of services and made provision for special services.

Union, county seat of Union co., S. Carolina, U.S.A., with cotton mills. Pop. (1930) 7419.

Union, or Tokelau, a group of islets in the Pacific, 350 m. N.E. of Samoa. The principal are Fakaofu, Nukunono, Nassau, Atafu, and they belong to Britain, being included in the Gilbert and Ellice Isles. Copra is the chief product. Area 7 sq. m. Pop. 1000.

Union, or Workhouse, see POOR LAWS.

Union Carbide and Carbon Corporation is a holding company organised in 1917 in the U.S.A. and operating thirty-five subsidiary concerns. It manufactures carbides, acetylene, a great number of alloys for the making of hard steel, chemical compounds used in the making of explosives, and a vast number of carbon compounds.

Union-Castle Steamship Line was formed by the amalgamation of the Union (founded 1853) and the Castle (founded 1872) Lines in 1900. The Union Line from 1857 carried on a mail and passenger service from Southampton to the Cape and Natal, and at the time of its amalgamation had a fleet of twenty-three vessels. The Castle Line from 1872 shared the gov.'s mail contract with the Union Line, starting from London instead of Southampton; in 1900 it had a fleet of twenty vessels. The fleet now (1931) consists of some thirty-five full-powered steamers and motor vessels, totalling 356,662 tons gross. The largest boats of the line are *Arundel C.* (1921) 19,023 tons; *Windsor C.* (1921) 18,967; *Carnarvon C.* (motor-ship) (1926) 20,063; *Winchester C.*

(1930) 20,100; and *Warwick C.* (building).

The Cape mail service was started by the dispatch from Southampton of the *R.M.S. Dane*, a boat of 530 tons, in 1857. The Cape Parliament made an allowance to the Castle Line for the carriage of letters and granted an additional bonus of £100 per diem for delivery within a stipulated period, a concession which brought a gain to the line of £1000 a voyage; but in 1876 the mail service was equally divided between the Castle Line and the Union Line.

Union City, a city of Hudson co., New Jersey, U.S.A., on Hudson R., opposite New York. Pop. (1930) 58,659.

Union College, Schenectady, New York, was founded in 1795 as a non-sectarian centre of higher education by representatives of various denominations. It owes its growth and development very largely to the energetic and enlightened policy of Dr. E. Nott, who was its president for over fifty years. In 1931 its enrolment of regular students numbered over 800. There were eighty members on the faculty. Its library has 71,000 volumes.

Union (Irish). The U. of Great Britain and Ireland was effected on Jan. 1, 1801, after being rejected by the Irish Commons the previous year by only one vote. The 'bigoted fury of Irish Protestants,' the attitude of the Irish Parliament during the disputes over the regency, and the fact that it was only by 'hard bribery' that the Eng. gov. could secure their co-operation in the simplest measures of administration, all conspired to convince Pitt at the end of the eighteenth century of the absolute political necessity for U. There can be no doubt that the Act of U. was passed contrary to the wishes of the Catholic pop. of Ireland; but this was prior to the days of electoral reform, and the representatives of the Irish people, such as they were at that time in the Irish Parliament, were eventually induced by a liberal and shameless distribution of pensions and peerages to withdraw their opposition to the Bill. The Act provided that one hundred Irish members should become part of the House of Commons at Westminster, and twenty-eight temporal with four spiritual peers, co-opted for each parliament by their fellow peers, should represent Ireland in the House of Lords. Commerce between the two countries was to be free from all restrictions, and the trading privileges of each were to be freely extended to the other, while there was to be a proportional distribution of the burden of

taxation between the two nations. The Eng. Parliament, however, reckoned without its host in the shape of agrarian discontent and poverty, not to mention the rankling sense of injustice that lurked in the bosom of Irish Catholics ever since the earliest days of the Eng. settlements; and the 'Irish question' never ceased to be the great thorn in the side of every British Gov. of modern times. Some measure of tranquillity was restored to Ireland in 1870 when an Act was passed to improve the position of the Irish tenants, and again in 1881 when the Gladstone Gov. of that year gave tenants the right to sell or transfer their right of tenure, to demand that rents should be fixed, and that leases should be renewed for a definite period. None of these or later land reforms, however, satisfied the Irish people, and peace of an ambiguous nature was preserved by such coercive measures as the Irish Crimes Act of 1892, passed by the Conservative Gov. under Lord Salisbury. The U. was dissolved in 1921, when the Irish Agreement of Dec. 6 was concluded. This agreement was implemented by the Irish Free State (Agreement) Act of 1922, which conferred dominion status on the Free State. The Irish Free State Constitution Act, 1922, provided for the constitution of the Free State and formally ratified the Agreement of 1921 (see also **IRISH FREE STATE**).

Unionist, see **CONSERVATISM**, **CONSERVATIVE PARTY**; **POLITICAL PARTIES**.

Union Jack, see **FLAG**.

Union Pacific Railroad is one of the greatest railway systems in the U.S.A. It was chartered under an Act of Congress in 1862, when it was considered necessary to have more railways, primarily for the purposes of pursuing the Civil War. To-day the system embraces 10,000 m. of railway, running through thirteen states. In the main, it covers the territory from Council Bluffs and Kansas City in the E. to the great Pacific coast cities of Los Angeles, Portland and Seattle, serving Denver, Cheyenne, Salt Lake City, Tacoma, and Olympia.

Union Steamship Company of New Zealand was originally formed to carry on communication between the different ports of New Zealand and with Australasia. In 1875 the present company was formed, and extended its services to the Pacific, Canada, and India. The line has now over fifty ships, aggregating about 218,530 tons gross, the largest ships being *Aorangi* (1924) 17,491 tons; *Niagara* (1903) 13,415; *Leitrim* (1915) 8989; *Limerick* (1925) 8684; and *Makura* (1908) 8075.

Union of Socialist Soviet Republics (or Russia). This union was set up in 1922 or five years after the beginning of the Russian Revolution. Delegates of the four principal Soviet Republics met at Moscow on December 30 of that year and concluded a Treaty of Union establishing a Union of Socialist Soviet Republics, comprising Russia (R.S.F.S.R.), Ukraine (U.S.S.R.), White Russia (W.R.S.S.R.), and the Transcaucasian Federation (T.S.F.S.R.). In Sept. 1924 the Uzbek S.S.R. and the Turcoman S.S.R. were formed and joined the Union. In 1929 Tajikistan was formed and joined. The Constitution of the Union was ratified by a Congress of Soviets which met in Jan.-Feb. 1924. *See also RUSSIA.*

Uniontown, a city of Pennsylvania, U.S.A., and the co. seat of Fayette co. Among the industries are glass-blowing and iron-founding. Pop. (1930) 19,344.

Unit, *see* UNITS.

Unitarianism. The term, in its strict and literal sense, denotes simply belief in one God, and when thus understood is a generic term applicable not only to Christianity but also to Judaism, Mohammedanism, and every form of monotheism. But it is almost invariably used as the designation of the belief held by certain Protestants who, while rejecting the scheme of orthodox theology as a whole, nevertheless acknowledge the pre-eminent position of Jesus Christ in the world's history, as a teacher of religion and a prophet of righteousness. This definition is somewhat vague, but the necessity for vagueness will be seen when we remember that certain Unitarians have shown such a zeal against dogmatism and definition as to object to the term Unitarian itself. No confession of faith has ever been issued by a Unitarian body, and it is difficult not to fall into a list of negations when describing Unitarianism. Unitarians deny the Deity of Jesus Christ, the doctrines of original sin, the atonement, and eternal punishment, held by other Christian bodies. A modern summary of their faith enumerates the Fatherhood of God, the Brotherhood of Man, the Leadership of Jesus, the Victory of Good, the Kingdom of God, and the Life Eternal. They have always freely welcomed the assured results of growing biblical criticism and study, and most modern Unitarians would regard inspiration of the Bible as differing only in degree and not in kind from that of other great literature. The Eng. Unitarians trace their descent from those Presbyterians whose ministers were ejected in 1662, many of whose chapels are now in

Unitarian hands. Many of the American Congregationalists are also Unitarian in belief. A comparison of Unitarianism with Arianism and Socinianism may be made by reference to the articles on those subjects. Unitarianism still flourishes in the dists. which embraced it at the time of the Socini, and especially in Transylvania. In this country, during the reigns of Edward VI., Elizabeth, and James I., several persons expiated the offence of this form of heresy at the stake. During the Commonwealth, the first avowedly Unitarian society was gathered together by John Biddle, but did not survive him. A more stable organisation was that made in 1775 by Theophilus Lindsey, who had seceded from the Established Church in the preceding year. Unitarians continued to suffer under various civil disabilities until 1813, when the last of these were removed. Since that time U. has flourished in England under such leaders as Priestley, Belsham, Martineau, Thom, Spears, Drummond, Wicksteed, Stopford Brooke, Estlin, Carpenter, and through the influence of the Americans Channing and Theodore Parker. Its ministers are trained chiefly at Manchester College, Oxford, the Unitarian College, Manchester, and the Presbyterian College, Carmarthen. In the U.S.A. the first official acceptance of Unitarianism was by King's Chapel, Boston, in 1782. It was fostered by John Sherman, Hosea Ballou, W. E. Channing. Harvard Divinity School was distinctly Unitarian until it was made unsectarian in 1870. The Meadville Theological School was founded by the Unitarians (1844), and the Unitarian Theological School at Berkeley College, California (1904). There are 60,152 Unitarians in the U.S.A., 353 churches and 488 ministers. *Consult* J. H. Allen, *Historical Sketch of the Unitarian Movement*, 1883; Clarke, *Unitarian Belief*, 1884; *Modern Unitarianism*, 1886; S. A. Eliot, *Heralds of a Liberal Faith* (3 vols.) (Boston), 1910; J. E. Carpenter, *Unitarianism: a Historic Survey*, 1923; E. M. Wilbur, *Our Unitarian Heritage*, 1926; and the biographies of W. E. Channing, J. Priestley, J. Martineau, Theodore Parker, and others named above.

United Brethren in Christ. This denomination resulted from the religious awakening of Philip William Otterbein, Martin Boehm and their collaborators, the church itself having its inception at a meeting held about 1766 near Lancaster, Pennsylvania. The church was formally organised in Frederick Co., Maryland, in 1800.

Its theology is Arminian, and its beliefs are those of the earlier evangelical denominations. It now has over 400,000 members. It maintains several educational institutions, besides homes and orphanages. The headquarters are at Dayton, Ohio, and the official organ of the church is *The Religious Telescope*, the *Watchword* being the young people's paper.

United Free Church of Scotland, a Scottish Presbyterian body, formed in 1900 by the union of the United Presbyterian Church and the Free Church of Scotland (*q.v.*). This union was the result of a long series of negotiations prompted by a strong and general desire for reunion.

United Irishmen, a league founded in 1791 by Theobald Wolfe Tone, mainly in order to secure the political emancipation of Rom. Catholics and Dissenters. Its members were, therefore, drawn from almost all the Irish religious bodies. Its organisation was largely a result of the movement connected with the Fr. Revolution, and it was marked by a vigorous antipathy to everything Eng. It brought about risings in the N. of Ireland in 1797 and 1798, marked by bloody atrocities. Help was expected from France, but none came, and the rebellion was subdued. See Madden's *The United Irishmen*, 1858.

United Kingdom, comprises the political entity of England, Wales and Scotland. The title, prior to the Irish Treaty of 1921, was the 'United Kingdom of Great Britain and Ireland.' For the changes in the King's title consequent on the establishment of the Irish Free State, see INTER-IMPERIAL RELATIONS REPORT.

United Methodist Church, see METHODISM.

United Presbyterian Church, see SCOTLAND, CHURCH OF.

United Press, an American news service using cables, telegraph, radio, and telephone, was founded in New York in June 1907 by the combination of three older organisations. It was decided at the start that it should be non-exclusive in principle. In other words, it would sell its news service in any city to as many newspapers as desired to buy it. To maintain absolute independence in the presentation of news, it was also decided that it would make no news exchange arrangements with any of the so-called 'official' news agencies so common in Europe. This added greatly to the expense at the start, as it necessitated setting up its own bureaus in all the leading European countries. It started business with a nucleus of 247 newspapers in the U.S.A. In 1908 it secured its first customers in Japan. In 1916 it made important arrangements in S.

America. In 1919 it started serving both morning and afternoon papers. In 1921 it invaded the European sales field. In 1932 it was furnishing news to more than 1200 newspapers in forty-seven different nations and territories and printed in nineteen languages. It maintains seventy-four bureaus, of which forty-nine are in the U.S.A. and the balances scattered all over the world, with big ones in every important S. American country, two in China, and important territorial bureaus in London, Paris, Berlin, Rome, Madrid, Lisbon, Geneva, Moscow, and Tokyo. In the U.S.A. alone 140,000 m. of leased telegraph wire are used in handling the news. More than 600,000 words daily are transmitted by wire and cable from New York alone. In London is situated the divisional office for all Europe and from there news goes to all the British Empire.

United Provinces of Agra and Oudh (formerly called the North-Western Provinces and Oudh), in British India, is situated in the valley of the Upper Ganges. The prov. is bounded by the Punjab and Tibet on the N., Nepal and Bihar and Orissa on the E., the native states of Central India on the S., and Rajputana and the Punjab on the W. The area, not counting three native states, is 106,295 sq. m. The territory is mostly plain, watered by the Ganges and the Rampur. To the N. a spur of the Himalayas encloses the border of the prov. The climate is hot and rather unhealthy. Wheat, rice, barley, millet, maize, and sugarcane are grown in considerable quantities. Irrigation by canal is practised. The principal manufactures are cotton, leather, opium, sugar, and indigo. Engineering is an important industry. Cawnpore is the chief industrial centre; other important cities are Benares, Allahabad, Lucknow, Agra, and Meerut. The United Provs. is administered by a governor, acting under the authority of the Governor-General of India. There is a legislative council to advise and assist the governor in his duties, which is partly nominative and partly elective in its constitution. Pop. (1931) 48,408,763; Agra, 35,613,784; Oudh, 12,794,979.

United States of America: Geographical Position and Boundaries.—The U.S.A. lie roughly between 25° N. and 49° N. lat., and 69° W. and 125° W. long. The boundaries are the Atlantic Ocean on the E., the Gulf of Mexico and Mexico on the S., the Pacific Ocean on the W., and the Dominion of Canada on the N. The estimated area is 3,026,789 sq. m. The non-contiguous territory of the

U.S.A. is composed of Alaska, Porto Rico, Hawaii, Philippine Islands, Virgin Islands, part of Samoa, Guam Island, and the Panama Canal Zone—in all 711,604 sq. m. The pop. of the U.S.A. in 1930 was 122,775,046. The pop. of its possessions was 14,233,389. The U.S.A. proper showed an increase of 16.1 per cent. in pop. over 1920. In 1910 the rural pop. exceeded the urban by 7,000,000. In 1920 the urban slightly exceeded the rural. In 1930 the urban pop. was 68,954,823, the rural 53,820,223.

Surface.—The surface of the U.S.A. from E. to W. may be divided as follows: (1) The Atlantic Plain, which extends from the coast to the Appalachian system (formerly called the Alleghanies). (2) The Mississippi Valley and Great Central Plain, which extends from the Appalachian Mts. W. to the Rocky Mts., an enormously fertile region about 1000 m. by 1000 m. in extent. (3) The Western Highlands. (4) The Pacific Slope, which extends from the Rocky Mts. to the Pacific Ocean.

Mountains.—The chief mountain systems are the Appalachian ranges in the E. and the Rocky Mts. in the W.

(1) The Appalachian system consists of very anc. rocks, which were elevated in former ages to a great height, and then reduced by erosive forces to a broad lowland. More recent elevation is responsible for some of the present ranges, while others are remainders of the earlier movements which have resisted erosive forces. The surface of this region to-day is a series of parallel ranges divided by fertile valleys. The various ridges are named as follows: the Blue Ridge, which lies nearest the Atlantic; the Kittatinny Chain; the Alleghany Mts., which lie in the western part of Virginia and the central part of Pennsylvania; the Cumberland Mts., on the eastern boundary of Tennessee and Kentucky; the Adirondack Mts., in the state of New York, which are continued in the Sacondago Chain; the Green Mts., in the state of Vermont; the Hudson R. Highlands; and the hills of New Hampshire. There is no peak of marked elevation in the Appalachian region, the highest point being Mt. Washington in New Hampshire, which reaches a height of nearly 7000 ft.

(2) The Rocky Mt. system is composed of comparatively recent formations, and in some parts elevation still goes on. Many of the ranges are anticlinal, and many peaks rise to great heights. Volcanoes or extinct volcanoes are numerous. The U.S. Rocky Mt. system extends from 29° N. to 49° N. lat., a distance of about 2000 m. The system is continued in

Canada. The Rocky Mts. are not a single range, but are double and sometimes threefold. These ranges are the edge of a region of plateaus and hills which extends to the coastal mountains. The chief mountain ranges belonging to the U.S. Rockies are the Bitter Root Mts., the Blue Mts., and the Big Horn Mts. in the N.; the Wahsatch Mts., the Wind R. Mts., and the White Mts. in the centre; and the Sierra Madre and the Sangra de Cristo Range in the S. The highest peaks are Mts. Harvard and Lincoln, both over 14,000 ft. In the western part of the southern Rockies lies the Great Basin of Colorado, with the Wahsatch Mts. on the E., and the Sierra Nevada on the W. This basin is extremely arid, has suffered much volcanic action, and is intersected by deep cañons cut by the rivs.

The W. of the highland region of the western U.S.A. is bounded by the Pacific Mts. These consist of three ranges, the Sierra Nevada, the Cascade Range, and the Coast Range. These are broken only by the rivs. which cut their way through to the coast. The descent from the hills to the coastal plain is very steep.

Coast.—The E. coast of the U.S.A. continues the Continental Shelf of Canada. This shelf was at one period in the geological history of the country completely uncovered, and at another period the whole of the present coastal plain, as well as the present Continental Shelf, was submerged. The Continental Shelf practically disappears off Florida.

The riv. valleys which cross the coastal plain and the Continental Shelf are now partially submerged, and so give safe and deep harbours. From the northern boundary of the U.S.A., as far S. as Cape Hatteras, the coast is low and, especially north of New York State, rocky, the coast of Maine eminently so. The coast of New Jersey, on the other hand, is sandy, and, farther south, off the Atlantic coast and also along parts of the coast of the Gulf of Mexico, there are numerous sand-spits with shallow channels, lagoons and swamps behind them, the coast of Florida in particular being fringed with lagoons. The harbours of this part of the coast are not good naturally. The coast of the Gulf of Mexico is low and very swampy.

There is only one considerable indentation on the E. coast of the U.S.A., viz. Chesapeake Bay, which runs inland in a northward direction for more than 180 m., with an average breadth of about 15 m. It is probable that the islands which lie between the Gulf of Mexico and the Atlantic were once part of the mainland, in

which case what is now the gulf was then a large inland sea analogous to the Mediterranean.

The Pacific coast of the U.S.A. has a very narrow Continental Shelf, and few bays or capes. The only considerable indentations are San Francisco harbour, which is deep and safe, and Puget Sound, between the state of Washington and British Columbia, which bites deeply into Washington, forming a vast natural harbour, the cause of the rapid growth of the city of Seattle.

Rivers.—The rivs. of the Atlantic Plain rise in the Appalachian system, and are comparatively short. In some cases they are too rapid to be of much value for navigation, but are valuable as supplying water power. The others almost without exception have good harbours at their mouths. The chief are: the Hudson, (315 m.), the Delaware (350 m.), the Susquehanna (200 m.), the Potomac (420 m.), the James (450 m.), and the Savannah (450 m.). The Hudson is the most valuable for commerce, as it is connected by the Erie Canal with Buffalo and the Great Lakes, while the Richelieu Canal connects it with Montreal. It is also the most striking and on account of its broad expanse and abutting hills is called the American Rhine.

The Great Central Plain is drained by the Mississippi-Missouri riv. system, the basin of which covers half the area of the U.S.A., and is equal in area to about one-third the area of Europe. The Mississippi rises in Lake Itasca in Minnesota, at about 1500 ft. above sea-level. After flowing for about 100 m. in an easterly direction it turns S., and is joined by numerous tributaries. The chief are: the Missouri, which enters the Mississippi just above St. Louis; the Ohio, which joins the main riv. at Cairo; the Arkansas, the Wisconsin, the Illinois, and the Red R. The Mississippi is 2486 m. long; the Missouri, 2945 m.; the Ohio, 1283 m.; the Arkansas, 1460 m.

The Mississippi-Missouri has made a broad flood plain, varying in width from 30 to 60 m. This plain is subject to severe inundations, for it slopes very gently away from the riv. bed, which is in many parts of the riv. above the level of the surrounding plain contained by levees maintained by the government. When these break great floods occur. The riv. carries a vast amount of silt, which it deposits at its mouth, thus forming a delta which stretches a series of long narrow tentacle-like arms seaward.

Other rivs. falling into the Gulf of Mexico are the Mobile and the Rio Grande. The Mobile, which enters

the gulf at the tn. of Mobile, is the union of the Alabama (600 m. long) and the Tombigbee. The Rio Grande (about 1650 m. long) forms the boundary between Texas and Mexico.

The rivs. flowing into the Pacific are comparatively short, owing to the nearness of the coast ranges to the sea. The Colorado R., 1650 m. long flows into the Gulf of California, after crossing an arid plateau. It has cut for itself a deep cañon with almost perpendicular banks, in many places more than a m. high. The San Joaquin and the Sacramento rivs. unite and flow into the harbour of San Francisco; these and the Columbia, 1270 m. long, are the only important rivs. on the W. of the U.S.A.

The Great Basin of California is largely an area of inland drainage. The rivs. flow into lakes with no outlets to the sea.

Lakes.—Of the Great Lakes of N. America Lake Michigan lies within the U.S.A., and the southern shores of Lake Ontario, Lake Erie, Lake Huron, and Lake Superior are U.S. territory. These lakes were formed by the action of the glacier which once covered the continent as far S. as the forty-second parallel, roughly speaking. They are remainders of much larger lakes and are of the utmost importance as waterways. They comprise the greatest inland body of fresh water in the world and carry ships comparable to those of the ocean. New England has very many smaller lakes which are also the result of glacial action. The largest lake of the U.S.A., apart from the Great Lakes, is the Great Salt Lake of Utah. The extremely low rainfall of this region and the intense evaporation consequent upon the high temperature are responsible for the salinity of the waters of the lake.

Natural Wonders.—Of the great natural wonders the chief are the Niagara Falls; the Grand Cañon of Colorado; Mammoth Cave, Yosemite Valley; and Yellowstone Park.

Climate.—A country as large as the U.S.A. and one having so wide differences of elevation must necessarily have a climate of wide differences of temperature and of rainfall.

Temperature.—In summer the hottest region of the U.S.A. is Arizona which in July has an average temperature of 90° F. The eastern coast has an average July temperature of between 70° and 80°, while the average July temperature of Florida, of the Gulf Coast, and of the more western part of the Central Plain, is between 80° and 90°. Owing to the tempering influence of the Pacific, the average July temperature of the W. coast is slightly lower. In winter the iso-

therms tend to run in almost parallel lines curving slightly N. over the W. coast, and slightly S. over the Central Plain. The average Jan. temperature of the extreme S. of Florida is 70°, that of the greater part of the W. coast is between 39° and 60°, while the greater part of the E. coast averages in Jan. a temperature between 19° and 32°, the temperature gradually decreasing as we go N. This applies also to the Central Plain. The S.E. states, therefore, have almost a sub-tropical climate, without any extreme variation between the winter and summer temperatures. The eastern and central states are subject to much greater variations of temperature, while the western coast is less extreme in climate than are the other parts of the U.S.A. The rainfall is heaviest in Alabama, Mississippi, Gulf States, and on the E. coast; it gradually decreases towards the W.; California and Colorado are dry, and the northern part of the W. coast has an abundant rainfall. The driest states are Arizona, Nevada, Montana, and New Mexico. The rainfall of the E. coast is steady and rather greater than that of England. The rainfall in the Gulf States is heavier and is chiefly monsoonal in character, falling mainly in the summer. The winds from the Pacific bring rain to the W. coast, but the Sierra Nevada Mts. shut these winds off from the Great Basin in Nevada and Utah, which has an average yearly rainfall of less than 10 in. The climate of the Central Plain is rendered colder in winter owing to there being no shelter from the winds blowing from the N. The Central Plain and the New England States have heavy snowfalls in winter, while perpetual snow lies on the summits of the Rockies and of the Coast Ranges.

Vegetation.—Great variety marks the vegetation of the U.S.A. In their natural state the eastern coastal plain and the eastern highlands were covered with temperate forests; the chief trees of these forests were the maple, the birch, the red pine, the white pine and the spruce. These have, of course, been largely cut down. The southern states (the Gulf States) have some sub-tropical forest trees which yield woods valuable in commerce. The western coast forests are extensive, and are noted for the enormous size of some of their trees, which are mainly spruce, cedar, redwood, and the Sequoia pine. The Central Plain was originally covered on the E. with mixed forest and grass lands, which merged into grass lands without forests to the W. as the rainfall decreased. This dist. is now the great wheat and grass area

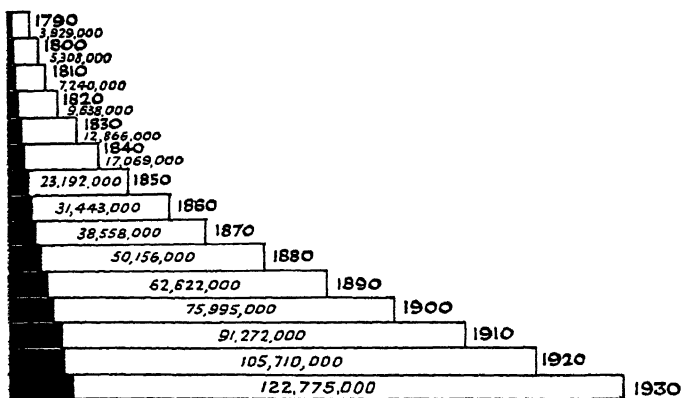
of the U.S.A. The Great Basin region has not much vegetation; what there is is mainly of a desert type, though where irrigation works have been successfully carried out this region has proved itself capable of supporting a luxuriant vegetation. Maize, potato, tomato, pumpkin, tobacco were unknown in Europe until introduced from America. Practically every kind of crop from those of temperate regions to the sub-tropical can be successfully grown. Hence the enormous yields of cotton, tobacco cereals, small fruits, vegetables. The U.S. census for 1930 showed 6,288,648 farms, with total value of 57,246,244,082 dollars. The value of farm products sold was \$92,481,491 dollars. The number of tractors used was 920,395. Nearly a billion acres were farmed and over three billion dollars worth of implements were used.

Animals.—The Central Plains of the U.S.A. were once the haunt of the bison, but it is now almost exterminated, though herds are still preserved with sedulous care in the Yellowstone dist. Other indigenous animals are the grizzly bear, which belongs to the Rockies, the opossum, the prairie dog, the puma, the wild cat, coyote, and various kinds of deer. The fish include cod, halibut, mackerel, shad, and salmon. Many varieties of fresh-water fish are found in the lakes, including the white fish, the trout, and the sturgeon.

Minerals.—The U.S.A. is rich in almost every kind of mineral. There are seven main coalfields supplying bituminous coal. These are: the Appalachian, the Central, the Western, the Rocky Mt., the Michigan, the Richmond Basin, and the Pacific coast fields. The only important source of anthracite coal is Pennsylvania. No less than twenty-three states produce iron in considerable quantities. The most productive iron mines are in the neighbourhood of Lake Superior; the most valuable mines apart from these are in the southern Appalachian region. The Lake Superior dist. is rich also in copper, which is found almost in its pure state. The eastern states are rich also in petroleum and in natural gas. Pennsylvania is the largest producer of these commodities in the E., but there have been enormous finds in Texas, Oklahoma and California. *Copper* is found also in Montana, in Arizona, and in Michigan. The U.S.A. produces more than half the world's supply of copper. *Zinc* is found in Kansas and in Missouri. *Gold* is found in the western states, especially in California and Colorado. It is found also in Alaska. *Silver* is

found in Montana, Idaho, Washington, Oregon, Nevada, and California. Large supplies of kaolin are found in the eastern states; some sulphur is mined in Nevada and Utah. Considerable quantities of marble are quarried in Vermont; sandstone is found in Ohio, Pennsylvania, Connecticut, and New York. Average figures for the annual production and value (in millions of dollars) of the chief minerals between 1925 and 1929 are as follows: *gold*, 2,277,000 troy oz., value 47; *silver*, 61,820,000 troy oz., value 37; *copper*, 894,135 long tons, value 263; *iron ore*, 75,602,734 long tons, value 160; *pig iron*, 41,757,215 long tons, value

rather than to a decrease in potentiality. The most famous oil wells are at Santa Fé Springs, Long Beach, Yates, and Seminole, but new pools of vast potentiality have been opened up—Oklahoma City Pool, Hobbs Pool in New Mexico, Van Pool in Texas, and others. The Kettleman Hills wells in the San Joaquin Valley (discovered Oct. 1928) are believed to be a vast field for crude gas-gasoline production. The total value of mineral products of the U.S.A. in 1929 was 5,900,000,000 dollars, divided as follows: coal and petroleum 3,160,000,000 dollars; metallic products, 1,540,000,000 dollars; non-metallic, 1,200,000,000 dollars.



GROWTH OF POPULATION IN THE UNITED STATES OF AMERICA

(The coloured population is shown in black)

705; *zinc*, 611,209 short tons, value 80; *lead*, 672,498 short tons, value 93. Production in 1930 has been below the average in these minerals. Average production of steel is 49,321,000 long tons, but the 1930 output of 41,200,000 long tons shows a decline in spite of the increasing use of stainless steel, especially in architecture (cf. the Chrysler Tower and Empire State Building) and in automobiles. Other important metallic products are quicksilver, aluminium, tin, and platinum. Petroleum has been produced since 1887 and the average annual output of crude petroleum is 954,398,000 barrels (of 42 gals.). The year 1930 showed a decline in output (901 as against 1007 million barrels in 1929), but this was due to a decline in the demand for petroleum subsidiaries (kerosene, lubricants, and fuel oils)

Productions.—The U.S.A. is one of the most productive countries in the world. Her mineral wealth has already been shown, and her vegetable and animal wealth is not inferior. Her extensive forests give large supplies of lumber, the chief woods of commercial value being the white pine, the hemlock, the redwood, oak, spruce, fir, and long-leaved and short-leaved pine. The southern states and the lake region supply the greatest amount of lumber; the Pacific and New England states supply a somewhat smaller amount. Average annual production (1925–29 inclusive) is 35,490,000,000 board ft. Estimated production (1930), 27,000,000,000 board ft. These figures do not include Alaska, where 30,000,000 board ft. are cut annually, mostly spruce and hemlock. Turpentine, tar, and resin are also

obtained from the forests. Wheat, oats, barley, and maize are the chief cereals grown. *Wheat* is grown chiefly in Washington, Minnesota, Indiana, North and South Dakota, Ohio, and Oregon. *Oats* and *barley* are grown in the same dists.; barley is grown also in California. *Maize* is largely grown for fattening cattle, chiefly in Kansas, Nebraska, Iowa, Illinois, Missouri, Indiana, and Ohio. *Rice* is grown in the swampy parts of Louisiana and Texas. *Tobacco* is grown principally in Kentucky, S. Carolina, N. Carolina, Virginia, Georgia and Tennessee. *Sugar* is grown in Louisiana, but beet sugar also is manufactured from beets grown in Michigan, Nebraska, Colorado, Utah and California. *Cotton* is very largely grown in the U.S.A., in the south-eastern part of the country. There are two kinds, the 'sea-island' cotton, which has a long thread and is grown on the islands and coasts of Georgia, S. Carolina, and Florida, and the 'upland' cotton, which has a short thread. This is grown inland in the south-eastern states. The production in 1928 was nearly 16,000,000 bales of 500 lb. each. The leading cotton state was Texas; others were Alabama, Arkansas, Georgia, Mississippi and Oklahoma. *Flax* is grown in the U.S.A. mainly for its seed. The chief centre for it is Minnesota. The average annual production during six years (1925-30) of the principal crops is as follows (in millions of bushels): *winter wheat*, 577; *durum wheat*, 60; *other spring wheat*, 195; *maize (corn)*, 2421; *oats*, 1360; *barley*, 296; *grain sorghums*, 105; *rye*, 48; *buckwheat*, 12; *flax*, 23; *rice*, 41; *all vegetables*, 335. Average production of *cotton* is 13,000,000 bales, and of *cotton-seed* 6,531,000 tons, the value of the *lint* and *cotton-seed* together being 1,115,000,000 dollars. Average production of *tobacco* is 1,464,000,000 lb., value 262,000,000 dollars. *Cultivated hay* amounts to about 100,000,000 tons and *wild hay* 10,000,000 tons. *Sugar* production (1925-30) totals an average of 2,391,000,000 lb., of which nearly 90 per cent. is beet sugar, the remainder cane.

Stock Farming.—Sheep, cattle, pigs, and horses are largely reared in the U.S.A., for pastureage is cheap and plentiful. Cattle and sheep are raised chiefly in the Great Central Plain, the sheep for their wool. Pigs are raised in Iowa, though all the maize-growing states have some pigs. Horses are raised largely in Texas, and mules in the southern and western states. Poultry and eggs are important in the export trade. The

1930 census showed there were in the U.S.A. 13,383,574 horses; 5,353,993 mules; and 54,269,996 cattle, of which 20,496,329 were milch cows; 32,796,958 hogs; 378,888,128 chickens; 16,794,435 turkeys; 11,337,457 ducks; 3,989,831 geese; and 56,985,626 sheep.

Manufactures.—The U.S.A. has every advantage as a manufacturing country. Coal and iron supplies are abundant; there is an abundance of water power in the eastern states; water communication, both natural and artificial, is excellent. The chief manufactures are those of iron and steel, cottons, woollens, silks, rubber products, motor-cars, machinery and food preparations. The chief *iron manufactures* are in Pennsylvania, Alleghany county being the most important dist., and Pittsburgh the most important tn. This state manufactures mainly steel for bridges, frames of buildings, rolled steel, nails, etc. Tools and cutlery are manufactured in the New England States, agricultural implements in Illinois and Connecticut. Average cost of materials (in millions of dollars), 3400; value of products, 5736. *Machinery* is largely made in Chicago, New York, Pittsburgh, Philadelphia, and Cleveland. Steel shipbuilding goes on at Philadelphia, San Francisco, and other ports. Value of machinery (excluding transport equipment), 4587 (million dollars); value of transport equipment, sea, land, and water, 4624. Cottons are manufactured, mainly on the eastern Coastal Plain. The atmosphere is here sufficiently damp for the thread, and the line of falls by which the rivs. descend from the Appalachian hills to the plain supplies abundant water power for the working of the machinery. The Southern States, particularly N. Carolina, have begun the manufacture of cotton textiles and are displacing New England in this regard. Cotton manufactures value at 1717 million dollars, while wool production averages at 282,000,000 lb., the value of wool manufactures being 1134 million dollars. Average value (in millions of dollars) of silk manufactures is 720 and of rayon manufactures about 100. Production of rayon averages at 78,000,000 lb. Woollens are manufactured mainly in the New England States, and in Philadelphia and New York. The manufactures include men's suitings, women's dress goods, carpets, and felts. Silk is manufactured in New Jersey, New York, and Pennsylvania. Food manufactures and industries are important. They include the preparation of cattle, sheep, and pigs for export.

Chicago, Omaha, and Kansas City are the largest centres for this industry; from it arises the leather-making industry, whose chief dists. are New York, Philadelphia, and Worcester in Massachusetts. Flour milling is carried on mainly at Minneapolis, St. Paul, and at Superior. Fruit and salmon are canned very largely on the Pacific coast. Other very important industries are glass making, boat making, ready-made clothing manufacture, and coopering. Value of food and allied products is 10,165,000,000 dollars. The automobile industry and allied trades assume large proportions. The average annual production (1925-29) is 3,771,000 passenger cars and 417,000 motor trucks, total 4,188,000; value 3,134,000,000 dollars. Of the total production an average of only 52,000,000 dollars worth are exported, the remainder being absorbed in the domestic market. The year 1930 showed a decline in automobile production, which was in that year 3,400,000 cars and trucks, two million less than in 1929. Other important manufactures are glassware, silverware and hardware, asbestos products, druggist preparations and patent medicines, perfume and cosmetics, cigarettes, musical instruments, and fertilisers. The 1930 biennial census of manufactures shows number of establishments, 206,556; average number of wage-earners, 8,742,761; and (in millions of dollars) wages, 11,422; cost of material, plant, etc., used in manufacture, 37,731; and value of finished products, 69,419. Compared with 1919 census the number of wage-earners has increased by 5 per cent.; wages increased by 5.3 per cent., and the value of products increased by 10.7 per cent.

Inventions, Industrial Achievements, etc.—The invention of the cotton gin in 1793 revolutionised the cotton industry. In 1807 Robert Fulton's *Clermont*, tried on the Hudson, proved to be the first successful experiment in steam navigation. In 1837 Samuel F. B. Morse exhibited the telegraph. In 1841 Richard M. Hoe brought out the rotary press for printing newspapers. In 1844 the first telegraph was set up between Baltimore and Washington. In 1845 Elias Howe invented the sewing machine. The first trans-Atlantic cable, establishing communication between the U.S.A. and England, was laid in 1858. The Remington typewriter, shown in 1873, was invented by C. L. Sholes in 1868. In 1863 George Westinghouse devised the air-brake now employed on all railroads. In 1876 Alexander Graham Bell secured letters patent for his telephone. In

1877 Thomas Edison invented the phonograph; in 1879 the incandescent light; in 1887 the Pyro-magnetic dynamo, and in 1893 the kinetoscope, which was the original form of the cinematograph. The first successful experiments with the aeroplane were made by two Americans, the brothers Wright. See AERONAUTICS. Wireless between the U.S.A. and England was established in 1903. The first railroad tunnels under the Hudson, connecting New Jersey and Manhattan Island, were opened in 1908. One of the most celebrated engineering feats was the cutting of the Panama Canal (*q.v.*). In bridge-building also there have been remarkable achievements, culminating in the great Hudson R. bridge. See BRIDGES, AMERICAN. American inventiveness is proved by an average annual issue of some 47,000 patents. Since the Great War scientific and industrial discoveries and developments are more the result of organised research than of the work of individuals alone.

Communications and Railways.—The great rivers and the great lakes of the U.S.A. render communication easy. The latter, with the 'Soo' Canal and the Canadian Canal, give unbroken connection between Oswego on Lake Ontario and Duluth at the western end of Lake Superior, a distance of over 1000 m. Chicago is connected by water with the Atlantic by means of the lakes, the Erie Canal, and the St. Lawrence R. The railroad mileage of the U.S.A. is enormous, amounting to 249,433 m. (1929). The chief railways are the Northern Pacific, which runs from Chicago, through Duluth, to Portland, Oregon, whence branch lines run to Puget Sound and San Francisco; the Union and Central Pacific Railway, which runs from Chicago to Omaha, Cheyenne, Ogden (Salt Lake City is on a branch line from Ogden) to San Francisco; the Southern Pacific Railway runs from New Orleans W. across the Rockies to Los Angeles and San Francisco. There are also coast lines from New York to Jacksonville, New York to New Orleans, and lines from Chicago to New Orleans, and from Kansas to Washington. Other great lines are the Pennsylvania and New York Central, both systems communicating between the E. and Chicago, and having numerous branches. There are several connections with Canada. The popularity of the automobile has brought road-building to the fore. The road mileage is 3,024,233 (1930), but of this only 662,435 m. are surfaced, the remainder being earth roads, non-surfaced. Telegraphs and tele-

phones are controlled by private companies, the former largely by the Western Union Telegraph Co. (256,044 m. of pole line and cable; 1,934,020 m. of wire; and 25,061 offices in 1929), and the latter by the American Telephone and Telegraph Co., which has organised the Bell Telephone System (in 1931 76,248,000 m. of wire; 62,867,000 m. of exchange service wire; 19,341,295 telephones in use through 20,227 telephone exchanges). Post offices number 49,065 (1930). Air mail is carried over 26 routes, covering some 15,000 m. There is no gov. ownership or control of telegraphs. The business is entirely in private hands, the two chief concerns being the Western Union and Commercial Cable, both of which also own cable lines to Europe. The keen rivalry between the two companies has redounded to the benefit of the public which, especially in the larger cities, gets a 24-hour service not known elsewhere. There are far more telegraph offices and telegraph wires in the U.S.A. than in any other country in the world. In 1929 there were in the U.S.A. 2,365,413 m. of telegraph wires. The income from land-wire messages was over \$160,000,000 and the companies employed about 75,000 people, whose annual earnings were nearly \$90,000,000. In 1927 the number of messages sent over land wires was 215,595,494, or about one third of all the messages in the world.

Trade.—The U.S.A. has a very large coasting trade, the main ports for this being Boston, New York, Philadelphia, Baltimore, Charleston, New Orleans and Galveston on the E. and S. coasts. On the W. coast the chief ports for the coasting trade are San Francisco, Seattle, and Portland. The chief steamship lines are between New York and Bremen, London, Southampton, Liverpool, and Hamburg. Boston has communications with Liverpool, London, Glasgow, and with Canadian ports. Baltimore, Philadelphia, New Orleans and Galveston are ports for trade with the United Kingdom and for Europe. The ports of the W. coast are San Francisco, Seattle, Portland and Los Angeles, which trade with England, S. America, Japan, China, India, and Oceania. Another important port is Houston, Texas, the Houston Ship Channel, 50 m. long and 30 ft. deep, having been completed in 1925. Another ship channel, the Beaumont-Port Arthur, is an important outlet for oil supplies. The average total of exports (1925-29) in millions of dollars is 5175 and of imports 4504. Of foreign trade (1929-30: total, 4694 million dollars) 46.3 per cent. of the exports go to

Europe, 9.3 to S. America, 8.8 to Central America, 17.7 to Northern N. America, 12.0 to Asia, 3.4 to Oceania, and 2.5 to Africa. Of 1929-30 import trade (total 3849 million dollars) 30.9 per cent. came from Europe, 28.5 from Asia, 14.5 from S. America, 12.7 from Northern N. America, 10.2 from Central America, 2.2 from Africa, and 1.0 from Oceania. Average imports from the United Kingdom from 1925-30 value 174,000,000 dollars and exports to the United Kingdom 413,000,000 dollars. Beginning during the war period and continuing to the autumn of 1929 the U.S.A. enjoyed a period of unexampled prosperity. Both its export and import figures reached the peak, with the exports far exceeding the imports. But in 1929 came the slump on the New York Stock Exchange, followed by increasing business depression all over the country. World depression was registered by the rapidly declining exports. Bad business at home was registered by the rapidly declining imports. In 1928 the excess of exports over imports reached the formidable figure of \$1,036,912,000. In 1929 this dropped to \$541,634,000. In 1930 the figure was \$782,273,000, while in 1931 it had dropped to \$333,957,000.

Exports.—The chief exports of the U.S.A. are cotton, raw and manufactured, wheat and wheat flour, coal, iron, both raw and manufactured; electrical, agricultural, and industrial machinery; automobiles, including parts and accessories; petroleum, including crude and refined oils; copper, animal oils, lumber, cattle; tinned meat, fruit, and fish; hides, and tobacco. Average percentages of total exports and imports between 1928-30 are: *crude manufacturing materials*: 22.9 exports, 34.6 imports; *crude foodstuffs and animals for food*: 5.4 exports, 12.6 imports; *partly or wholly manufactured foodstuffs*: 9.3 exports, 9.6 imports; *manufactures to be further manufactured*: 13.8 exports, 20.1 imports; *completed manufactures*: 48.6 exports, 23.1 imports. Chief imports are raw silk, coffee, crude rubber, wood pulp, and paper manufactures, especially newspaper; tin and tin manufactures; petroleum and oils; hides, skins, furs, sugar cane, fruits, nuts, vegetable oils, jute, wood manufactures.

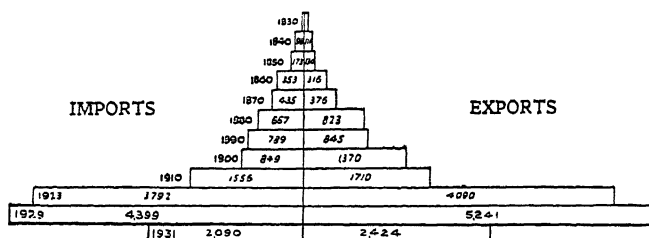
Character of Population.—The pop. figures for the census of 1930 show a total of 122,775,046 for continental U.S.A. divided as follows: white, 108,864,207; negro, 11,891,143; Mexican, 1,422,533; Indian, 332,397; Chinese, 74,594; Japanese, 138,834; Filipino, 45,208; Hindu, 3130; Korean, 1861; and others, 780. Of

the white pop., 95,497,800 were native born and 13,366,407 foreign born. Of the total pop., 62,137,080 were males and 60,637,966 females. The total number of immigrants in 1924 was 706,896, but since then the number has been much reduced, owing to the immigration laws. The average for 1925-29 was 304,182. Of the 1929 total of 279,678, 46,751 came from Germany, 41,248 from Great Britain and Ireland, 17,379 Scandinavia, 18,008 Italy, 4,428 France, 2,301 Austria and Hungary, 13,502 Russia and Finland.

Education is universal and compulsory in the elementary stages, and ranges from the kindergarten to the

in all some 900,000 students of both sexes, and about 67,000 professors and other instructors. American scholars are well to the forefront in all branches of knowledge, especially in such subjects as Eng. language and literature, psychology, education, and the various technical studies.

Religion.—American religion is very varied. The latest religious census (1930) shows 213 bodies with 232,154 organisations and a total membership of 54,576,346. There are very many Protestant denominations, of which the chief are Baptists, 8,440,922; Methodists, 8,070,619; Lutherans, 3,966,003; Presbyterians, 2,625,284; Epis-



GROWTH OF TRADE IN THE UNITED STATES OF AMERICA

(The figures represent millions of dollars)

university. 4.3 per cent. of the total pop. over ten years are illiterate (census 1930), but this is due largely to the enormous stream of immigrants, illiteracy rising to 9.9 per cent. in the case of foreign-born whites, and to past neglect of negroes, 16.3 per cent. of whom are illiterate. The control of education is exercised by the state and local authorities in conjunction. Elementary education is imposed on all between six and fourteen years of age, and is one of the most democratic in the world. In 1930, 69.9 per cent. of the pop. between the ages of five and twenty was attending school, numbering 26,849,639 persons. The public elementary schools are maintained by local taxation. There are 255,000 elementary and secondary schools, including 24,000 public high schools. Some institutions described as universities correspond rather to the Eng. high schools. Many of these receive state grants and most are run on the basis of co-education. University education in the U.S.A. is well provided for. There are over 1000 universities and university colleges, and numerous professional and technological institutions, embracing

copolians, 1,859,086; Disciples of Christ, 1,377,595. There are 18,605,003 Rom. Catholics, 4,081,242 Jews, 259,394 belonging to the Eastern Orthodox Church, and 542,194 Mormons.

Federal Constitution and State Governments.—There are three main factors in the U.S. Gov.—the Executive, the Legislature, and the Judicial Authority. The President possesses the executive power, and is elected every fourth year by electors chosen by each state to a number equal to the number of senators and representatives for that state, no senator or representative being eligible as an elector. Voting is by ballot. Should the result not give a clear majority to any candidate, the House of Representatives chooses from among the top three candidates. In the event of the President's death, the Vice-President acts as President till the next election. Provision is also made for a President in the event of the death of a Vice-President who has succeeded to the presidency. The legislature consists of two Houses—a Senate, elected for six years, and a House of Representatives for two. The latter con-

tains 435 representatives by the Apportionment Act of 1912 on the basis of the decennial census of 1910, but there has been no alteration in the number since 1912. The President has a veto power, which can be overridden by a two-thirds vote of each House. The senators and the representatives are chosen by popular vote. The judicial power rests with a chief justice and eight justices, who are appointed by the President. In addition each state has a legislature, with varying conditions as to election of senators and representatives, but in all cases consisting of two Houses and a governor elected by popular vote for from two to four years. *See* CONSTITUTION.

Army and Navy.—Under the provisions of the Act of Congress approved June 3, 1916, commonly referred to as the National Defense Act, the Army of the U.S.A. consists of the Regular Army, the National Guard while in the service of the U.S.A., and the Organised Reserves, the latter including the Officers' Reserve Corps and the Enlisted Reserve Corps. By the terms of the Constitution the President is the commander-in-chief of the army and of the navy. With respect to the military forces this command is exercised through the Secretary of War and the Chief-of-Staff. The military system is based upon voluntary enlistment, although during the Civil War, 1861–1866, conscription was resorted to, and during the Great War, 1917–18, a Selective Service Law was passed designed to make available for military service the entire man-power of the nation. The strength of the regular army has from time to time been augmented to meet the needs of expanding territory and increasing pop. During Washington's two terms as President the regular army varied in strength from 1000 to 5000 men. In 1811 the authorised force was 35,000 and in 1820 a reduction to 6000 was voted. For service in the war with Mexico, 1846–47, a regular force of 31,000 was authorised but not recruited to full strength. During the Civil War Congress authorised between 30,000 and 54,000 regulars with some millions of volunteer troops, but after 1866 the regular army was limited to 25,000 enlisted men. A force of 61,000 regulars was authorised for the war with Spain, 1898–99, this being again reduced following the return of peace. In all of these emergencies the forces were augmented by the addition of volunteers. Under the operation of the National Defense Act as amended and controlled by the provisions of the

annual appropriation Acts passed by Congress, the average strength of the army at the present time is 12,000 officers and approximately 125,000 enlisted men, the latter figure including about 6500 enlisted men who serve in the Philippine Scouts. For purposes of administration the army is distributed among nine Corps Areas, numbered 1 to 9 inclusive, and three departments, with headquarters as follows: Boston, Mass., New York, N.Y., Baltimore, Md., Fort McPherson, Ga., Fort Hayes, Ohio, Chicago, Ill., Omaha, Nebr., Fort Sam Houston, Texas, San Francisco, Cal.; Hawaiian Department, Fort Shafter, Hawaii, Philippine Department, Manila, P.I., and Panama Canal Department, Quarry Heights, Balboa Heights, Canal Zone.

The Adjutant-General is the channel of communication between the Secretary of War and Chief of Staff and the army at large, and instructions and orders relating to the activities of the army pass through his hands. His office is also the repository of all army records, including the papers relating to individual officers and enlisted men, as well as documents concerning miscellaneous subjects which pertain to the military service. Practically all correspondence concerning military personnel, whether with individuals in the service or with the general public, is conducted by him. A slight idea of the magnitude of this correspondence may be gained when it is noted that during an ordinary fiscal year more than 3,000,000 separate pieces of mail matter are received and disposed of. The Judge Advocate-General, as the title implies, is at the head of the legal department, and as such is the legal adviser of the Secretary of War, the Chief of Staff and the chiefs of other war department bureaus and services. He is the custodian of documents relating to the title to real estate owned or leased by the department, renders legal opinions as to the application of statutes, and performs such other similar duties as may be required of him. The Chief of Engineers, in addition to the customary military duties of such an officer, is charged with the construction and similar work necessary to the maintenance of harbours and proper conditions in rivers and other navigable waters. He also supervises the building of bridges across navigable streams and constructs engineering works in connection with flood control. The chiefs of the other arms and services listed in the following tables have jurisdiction over matters relating to their respective organisations, sub-

On June 30, 1930, the geographical distribution of the regular army was as follows:

Countries, etc.	Commissioned officers.	Warrant officers.	Enlisted men.	Total.
In the continental U.S.A.				
First Corps Area	439	64 *	4,165	4,668
Second Corps Area ¹	1,081	120	11,368	12,569
Third Corps Area	2,039	151	13,316	15,506
Fourth Corps Area	1,040	85	9,993	11,118
Fifth Corps Area	494	75	3,218	3,787
Sixth Corps Area	594	58	5,469	6,121
Seventh Corps Area	1,017	78	7,707	8,802
Eighth Corps Area	1,788	141	20,762	22,691
Ninth Corps Area ²	1,085	139	11,225	12,449
Total in continental U.S.A.	9,577	911	87,223	97,711
In Hawaiian Department	716	59	14,380	15,155
In Panama Canal Department	386³	46	8,870	9,302
In Alaska	9	1	305	315
In Porto Rico	63	5	1,030	1,098
In Philippine Department:				
Regular Army	518	61	4,111	4,690
Philippine Scouts	62	—	6,480	6,542
In China (U.S. Army troops)	58	2	948	1,008
In France⁴	34	3	—	37
In Japan⁵	—	1	—	1
In Nicaragua⁶	26	—	254	280
Miscellaneous⁷	806	—	700	1,506
Grand total	12,255	1,089	124,301	137,645

¹ Excluding Porto Rico.

² Excluding Alaska.

³ Includes Panama Civil Gov.

⁴ American Graves Registration Service and escorts of gold star mothers and widows visiting American cemeteries in Europe.

⁵ Transport quartermaster, Nagasaki.

⁶ Inter-oceanic canal survey.

⁷ Includes military attachés, students abroad, and personnel on leave and en route to and from oversea garrisons.

ject always to the control of the Secretary of War and the Chief of Staff. The Officers' Reserve Corps consists at the present time of approximately 113,000 members of all grades from major-general to second-lieutenant, commissioned in sections corresponding to the arms and services of the regular army. Of this number about 12,000 also hold commissions in the National Guard. Active-duty training is given to a certain proportion of the Reserve Corps each year. The Officers' Reserve Corps, originally composed largely of men who served as commissioned officers during the Great War, is maintained at full strength by the commissioning of eligible personnel drawn from many different sources, chief of which are the National Guard (commissioned and

enlisted), Regular Army (enlisted), civilians, and the Reserve Officers' Training Corps. The last-named organization consists of some 321 units located at colleges, universities, military schools, and high schools throughout the U.S.A., in which varying periods of military training are given. The enrolment in 1930 was approximately 114,000. From among graduates of this corps about 6500 Reserve officers are commissioned each year. The National Guard is composed of officers and enlisted men of all arms and services, distributed among the several states, each of which has its own separate organization. Within each state the National Guard forces form a contingent of which the governor is the commander-in-chief, command being exercised usually through a state

The strength by arms and services on the same date was :

June 30, 1930.			
Arm or Service.	Officers.	Enlisted men.	Total
General officers of the line	67	—	67
General Staff Corps	213	—	213
Adjutant General's Department	91	—	91
Inspector General's Department	41	—	41
Judge Advocate General's Department	95	—	95
Quartermaster Corps	706	7,536	8,242
Medical Department	1,202	6,417	7,619
Finance Department	120	400	520
Corps of Engineers	401	4,465	4,866
Ordnance Department	277	2,260	2,527
Signal Corps	208	2,625	2,833
Chemical Warfare Service	78	413	491
Bureau of Insular Affairs	3	—	3
Chaplains	120	—	120
Professors at Military Academy	8	—	8
Cavalry	609	7,794	8,403
Field Artillery	903	14,633	15,536
Coast Artillery Corps	655	12,324	12,979
Infantry	2,303	41,259	43,562
Air Corps	1,271	12,034	13,305
Detached list	2,653	5,647	8,300
Retired on active duty	136	24	160
Total (less Philippine Scouts)	12,160	117,831	129,981
Philippine Scouts	95 ¹	6,480	6,575
Warrant officers	1,089	—	1,089
Aggregate	13,344 ²	124,311	137,645

¹ Including 13 retired on active duty.

² Includes both commissioned officers and warrant officers.

adjutant-general. Ordinarily these troops serve only in their respective states, but they may, in an emergency, be called into the Federal service by the President, in which event they become a component part of the Army of the U.S.A. On June 30, 1930, the National Guard consisted of 12,732 officers, 198 warrant officers, and 169,785 enlisted men, an aggregate of 182,715. The Military Academy at West Point is the school for U.S.A. cadets (see WEST POINT MILITARY ACADEMY).

The U.S. Navy.—The Department of the Navy was created by Act of Congress in 1798. The Secretary of the Navy is a member of the cabinet. The personnel of the navy totals some 110,000 officers and men, and the material strength is: battleships 18; aircraft carriers, 3; cruisers, 3; light cruisers, 23 (including 9 under construction); destroyers 233, fleet submarines 7 (including 1 under

construction), and submarines 101. The six principal naval yards are at Brooklyn (New York), Norfolk, Mare Is. (San Francisco), Boston, Philadelphia, and Port Orchard (Puget Sound). There are also 10 of the 2nd, 3rd, and 4th classes, 2 training stations (Newport and Yerba Buena), 1 torpedo station at Newport, 1 gun factory at Washington, 1 ordnance-proving ground at Indian Head, and 5 coaling stations. The Air Service is part of the fleet and comprises 53 active squadrons and 45 inactive squadrons. The total expenditure on armaments for 1930-31 was \$39,906,459 dollars.

Arsenals in the U.S.A.—The manufacturing arsenals in the U.S.A. are located as follows: Augusta, Augusta, Ga.; Benicia, Benicia, Cal.; Frankford, Frankford, Pa.; Picatinny, Dover, N.J.; Raritan, Metuchen, N.J.; Rock Island, Rock Island, Ill.; San Antonio, San Antonio,

Tex.; Springfield Armory, Springfield, Mass.; U.S. Nitrate Plant, No. 1, Sheffield, Ala.; U.S. Nitrate Plant, No. 2, Nitrate Plant, Ala.; Watertown, Watertown, Mass.; Watervliet, Watervliet, N.Y.; Edgewood Arsenal, Edgewood, Md.

History.—It is fairly well established that the eastern coast of N. America was discovered in A.D. 1000 by Leif Ericson and his band of hardy Norsemen. They planted a colony in Greenland and in 'Vinland,' probably some place on the coast of what is now New England. But they left no traces, for the colonies perished and the memory of them died out of men's minds. It was left to Christopher Columbus on Oct. 12, 1492, to make the first really historic landing on American soil. He was not seeking a new world. Great and wealthy trading cities like Venice had established a big business in the gold, precious stones, and spices that came from India and China. Columbus was really seeking a sea passage to those lands of presumably fabulous wealth. The voyage of Columbus was not only daring, because he ventured the stormy Atlantic in three tiny vessels, but also because men's minds were filled with superstitious fears of what they would find when they ventured far on the 'ocean sea.' Columbus's first landing was in the Bahama Is. He believed he had landed in the Indies and hence called the natives Indians. His return to Spain fired the imagination of the people. The greed for land at once arose. The Portuguese had made some wonderful trips along the shores of Africa. So there arose a dispute between Spain and Portugal over the ownership of this new world. They appealed to Pope Alexander VI., who, in his bull of May 2, 1493, drew an imaginary line of demarcation. Under this all the New World, except a part of Brazil, was given to Spain. Columbus made three more voyages, discovering others of the W. Indies, the mainland of S. America at the mouth of the Orinoco, and the coast of Honduras. Soon the Eng. took part in the exploration of the new lands. Henry VII. granted a permit to John Cabot, to go on a voyage of discovery. To Cabot, who, like Columbus, was an Italian, belongs the honour of having first discovered N. America (apart from Ericson). Cabot and his men landed in 1497, either on Cape Breton Island, Newfoundland, or Labrador. In 1498 he made a second voyage, following the coast from Long Island right down to Cape Hatteras. Americus Vesputius (Vespucci), a friend of Columbus, made three voyages of discovery, landing on

the coast of Brazil in 1501. People believed Columbus had landed in the Indies. When Vesputius wrote a book on the New World, it dawned on men that a really new hemisphere had been discovered. In 1507 a Ger. professor, Waldseemüller, teaching in the college of St. Die in Lorraine, suggested that the New World be called America. This was soon generally adopted. Columbus, child of misfortune, was thus even robbed of the honour of giving his name as an enduring memorial to the world he had discovered. Now began a vast era of adventure and exploration. Some were attracted by adventure. Others by the lure of the gold and jewels they expected to find. The great maritime nations of that time—Spain, England, France, and Portugal—led in this, followed at some remove by Holland and Sweden. It is a curious fact in the world's history that peoples afterwards to be so powerful as the Gers., Russians, and Italians had no lot or part in this. The Spaniards discovered and explored all Central and S. America and then turned their attention to N. America. Ponce de Leon landed in Florida, seeking the fountain of eternal youth. Hernando de Soto discovered Cuba, landed in Florida and wandered all over the southern states discovering the Mississippi R., which he crossed into what is now Arkansas and Missouri. From France came Jacques Cartier in 1534, discovering the Gulf of St. Lawrence. On a second expedition he sailed up the St. Lawrence as far as the present site of Montreal, so called from the name he gave it—Mont Royal. The period had now begun when a contest was to ensue for the territory of the future U.S.A. and Canada. At first Spain had no serious rivals. She claimed not only S., but all of N. America. But Spain was now declining while England and France were rising powers. The defeat of the Spanish Armada opened the way to Eng. endeavour. Spain was vulnerable through her colonies. Hence her claims in the New World must be disputed. Sir Walter Raleigh founded a first colony in the territory he named Virginia, after the Virgin Queen. This was in 1585. This first colony failed, and the colonists were brought back to England by Sir Francis Drake. They took back with them two indigenous plants which were to change the history of the world—the potato and tobacco. In 1607 a second Virginian colony was established at Jamestown, which was saved from ruin by the doughty John Smith (q.v.). By 1649 Virginia, which now had a royal charter and

State and Abbreviation.	Date of Admission to the Union.	Gross Area ² in sq. m.	Population (1939).	Capital.
Alabama Ala.	1819	51,998	2,646,245	Montgomery
Arizona Ariz.	1912	113,956	435,573	Phoenix
Arkansas Ark.	1836	53,335	1,354,482	Little Rock
California Cal.	1850	158,297	5,677,251	Sacramento
Colorado Col.	1876	103,948	1,035,781	Denver
Connecticut Conn.*		4,965	1,606,903	Hartford
Delaware Del.		2,370	238,380	Dover
Florida Fla.	1845	58,666	1,468,211	Tallahassee
Georgia Ga.		59,265	2,908,506	Atlanta
Idaho Id.	1890	83,888	445,032	Boisé
Illinois Ill.	1818	56,665	7,630,654	Springfield
Indiana Ind.	1816	36,354	3,238,503	Indianapolis
Iowa Ia.	1846	56,147	2,470,939	Des Moines
Kansas Kan.	1861	82,158	1,880,999	Topeka
Kentucky Ky.	1792	40,598	2,614,559	Frankfort
Louisiana La.	1812	48,506	2,101,593	Baton Rouge
Maine Me.	1820	33,040	797,423	Augusta
Maryland Md.		12,327	1,631,526	Annapolis
Massachusetts Mass.		8,266	4,249,614	Boston
Michigan Mich.	1837	57,980	4,342,325	Lansing
Minnesota Minn.	1858	84,682	2,563,953	St. Paul
Mississippi Miss.	1817	46,865	2,009,821	Jackson
Missouri Mo.	1821	69,420	3,629,367	Jefferson City
Montana Mont.	1889	146,997	537,606	Helena
Nebraska Neb.	1867	77,520	1,377,963	Lincoln
Nevada Nev.	1864	110,690	91,058	Carson City
New Hampshire N.H.		9,341	465,293	Concord
New Jersey N.J.		8,224	4,041,334	Trenton
New Mexico N.M.	1912	122,634	423,317	Santa Fé
New York N.Y.		49,204	12,588,066	Albany
N. Carolina N.C.		52,426	3,170,276	Raleigh
N. Dakota N. Dak. or N.D.	1889	70,837	680,845	Bismarck
Ohio O.	1803	41,040	6,646,697	Columbus
Oklahoma Okla.	1907	70,057	2,396,040	Oklahoma City
Oregon Ore.	1859	96,699	953,786	Salem
Pennsylvania Pa. or Penn.		45,126	9,631,350	Harrisburg
Rhode Is. R.I.		1,248	687,497	Providence
S. Carolina S.C.		30,989	1,738,765	Columbia
S. Dakota S. Dak. or S.D.	1889	77,615	692,549	Pierre
Tennessee Tenn.	1796	42,022	2,616,556	Nashville
Texas Tex.	1845	265,896	5,824,715	Austin
Utah Ut.	1896	84,990	507,847	Salt Lake City
Vermont Vt.	1791	9,564	359,611	Montpelier
Virginia Va.		42,627	2,421,851	Richmond
Washington Wash.	1889	69,127	1,563,396	Olympia
W. Virginia W. Va.	1863	24,170	1,729,205	Charleston
Wisconsin Wis.	1848	56,066	2,939,006	Madison
Wyoming Wyo.	1890	97,914	225,565	Cheyenne
Dist. of Columbia D.C.	*1790	70	486,869	Washington
Alaska	Date of Acquisition. *1868	586,400	58,758	Juneau
Hawaii (inc. Midway Is.)	1900	6,407	368,336	Honolulu
Panama Canal Zone	1903	554	39,467	
Philippine Islands	1898-99	114,400	12,604,100	Manila
Porto Rico	1898	3,435	1,543,913	San Juan
Guam	1898	206	18,509	Agaña
Samoa (inc. Swain Island)	1899 & 1925	76	10,100	
Virgin Islands	1898	133	22,012	

¹ The original thirteen states. ² Gross area represents land and water. ³ Organised.

⁴ Purchased.

considerable self-gov. began to be settled by Cavaliers who founded the far-famed 'First Families of Virginia'—ancestors of some of the greatest men in U.S.A. history—George Washington, James Madison, James Monroe, and Chief Justice John Marshall. The foundation of Maryland marked a new kind of colony, one practically owned and ruled by a lord-proprietor holding a royal charter. Religious persecution in England led to the foundation of the New England colonies. The first of these occurred in 1620 when the Puritans, commonly known and revered in American history as the Pilgrim Fathers, landed at Plymouth Rock, in what is now Massachusetts, having sailed on the celebrated little ship the *Mayflower*—one of the most famous emigrant vessels in history. From its passengers sprang the aristocracy of New England and most of its great leaders and thinkers. Georgia was founded by James Oglethorpe and was the last of the thirteen original colonies which afterwards became the first thirteen states of the U.S.A. Pennsylvania was founded by the Quakers, led by William Penn. Ten of these colonies were Eng. New York had been founded by the Dutch as New Amsterdam and was afterwards to be taken by the Eng. New Jersey was started as a Dutch colony, but soon became Eng. Delaware was claimed by the Dutch, but really first settled by the Swedes, and finally came into possession of the Eng.

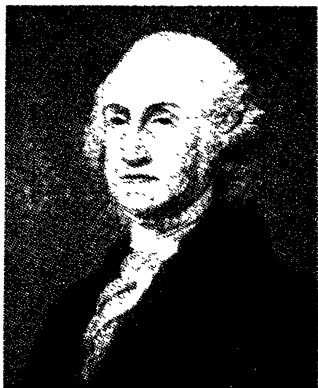
The wars of Europe had their repercussions in America: King William's War (1690-97) had its echo in America when the Indians, incited by the Fr., began a series of massacres of the Eng. The colonists retaliated with several fruitless expeditions against Canada. After a brief peace, France and England once more took the field in the War of the Spanish Succession, but always known in the colonies as Queen Anne's War (1702-14). Once more the Indians and the Fr. massacred Eng. colonists, especially in their attacks on the little villages of Deerfield and Haverhill. In 1710, after two earlier failures, the colonists, aided by a small force of Eng., captured Port Royal and took the territory of Acadia, which was henceforth called Nova Scotia. The Fr. Acadians were some years later deported, and out of this grew Longfellow's famous poem *Evangeline*. By the Peace of Utrecht Acadia, Newfoundland, and the Hudson Bay territory were formally ceded to England. But this treaty left open many grounds for war. The boundary between

the Eng. colonies and Canada was not settled and there was the great question of control of the vast Mississippi valley. The Fr. made haste to prepare for the coming struggle. They built the great fortress of Louisburg at the mouth of the St. Lawrence. They founded the colony of New Orleans, near the mouth of the Mississippi. To connect the two, they began a series of forts and settlements—Niagara and Detroit to guard the Great Lakes; Vincennes and Kaskaskia in the Illinois territory. In all they had more than sixty forts and they claimed all of N. America, except the Hudson Bay region and the narrow strip of Eng. colonies on the Atlantic coast. It seemed as if the future civilisation of the continent would be Fr. and not Eng. In Europe, from 1744 to 1748 England and France were on opposite sides in the War of the Austrian Succession. The American colonies were soon involved in it. Organised by Governor Shirley of Massachusetts, an expedition under William Pepperell of Maine laid siege to and captured the seemingly impregnable Louisburg. The Peace of Aix-la-Chapelle gave this back to France, to the intense indignation of the colonists, who were not consulted. But the two great European nations were soon in conflict again. There was a fresh dispute about the boundaries of Acadia. There were rival claimants for the Ohio valley. In 1749 the Frenchman, Bienville, staked out the Fr. claims at various points along the Ohio. In the same year the Ohio Company was formed by the Virginians to plant a colony and build a fort. In 1754 a young man named George Washington, who had acted as messenger for the Virginian governor in his protest against Fr. encroachments, started the war which was to decide the language and civilisation of N. America. In command of a small body of Virginia militiamen, he came into conflict with the Fr. at Great Meadows and the Fr. commander and nine of his men were killed. The war was thus started in America two years before it broke out in Europe. The odds seemed to favour the Fr. They were a united, cohesive body. They had many forts. They had the friendship of many of the Indians. The Eng. colonies were not united. They were jealous of each other and the colonial soldiers were jealous of the British regulars. In 1755 General Braddock was sent from England to take charge of operations. With a small force of British regulars, Virginians and Indians he set forth to capture Fort Duquesne (now Pittsburgh). The

British regulars fought steadily and well, but were decimated. Braddock had four horses shot under him and was finally mortally wounded. In Acadia the Fr. settlers were incited by Fr. officials to rebel against England. To forestall this, an expedition was sent there and more than 6000 Fr. Acadians were deported, being scattered among the Eng. colonies. In the meantime, on the whole, things were going against the Eng. In Montcalm the Fr. had a great leader who captured Fort William Henry on Lake George, but this deed was marred by the savagery of his Indian allies, who massacred women and children and some of the sick and wounded. When Pitt came into power in England a powerful fleet was sent to capture Louisburg, and this was accomplished by James Wolfe in 1758. At about this same time, however, Montcalm, in Fort Ticonderoga with 4000 men, brilliantly defeated 6000 British regulars and 9000 colonials. But the British captured Fort Frontenac and an expedition under General Forbes seconded by Washington, forced the Fr. to evacuate Fort Duquesne. In Sept. 1759 was fought the decisive battle for the capture of Quebec, which fell into the hands of the Eng. and the sovereignty of France in N. America was practically ended. By the Peace of Paris, signed 1763, England gave Cuba and the Philippines back to Spain and received Florida instead. France ceded to Spain New Orleans and the vast territory known as Louisiana. To England France surrendered the Ohio Valley, Canada, in fact everything except two little islands in the Gulf of St. Lawrence.

If England gained enormously, the war had been of immense value also to the colonies. The men from the thirteen settlements got to know each other and to feel that they had some aims in common. They had fought beside the redoubtable British regulars against the famous Fr. soldiers and had gained a corresponding idea of their own worth and mettle. At the same time, they began seriously to think of their own grievances. The Navigation Acts of England gravely hampered colonial trade. To protect the Eng. farmer, grain raised in the colonies was shut out. In retaliation, the colonies began manufacturing for their own needs and England forbade this. The general aim was to export manufs. to the colonies and import raw materials and food. The situation rapidly came to a head when George Grenville as Prime Minister decided that the Navigation Acts should be strictly enforced; that a standing

army should be garrisoned in the colonies; and that the colonies should be taxed. To enforce the Navigation Acts and prevent smuggling, customs officers, armed with search warrants, searched stores, warehouses, and even private dwellings. James Otis, an eloquent Boston lawyer, in a powerful speech in one of the Boston courts, called upon the colonials to resist, and over all the colonies his words were echoed and re-echoed. In Virginia another young lawyer, Patrick Henry, voiced similar sentiments. In fact England proposed to send the



GEORGE WASHINGTON

standing army to the colonies to protect them from the dangers of Indian outbreaks; but the colonists believed the army was to be sent to overawe them. Grenville proposed to raise the money for part of the support of this army by a stamp tax. The colonial assemblies all spoke against the proposed law, but it was adopted in 1765. A storm broke out in the colonies. In the Virginia Legislature Patrick Henry offered his famous resolutions that the people of Virginia were entitled to all the privileges of natural-born subjects of England; that they had the exclusive right to tax themselves, and that they were not bound to yield obedience to any laws except those of their own making. The resolutions were carried by a narrow majority. Under the leadership of Massachusetts, the colonies held a Stamp Act Congress in New York to petition the king and parliament. Riots occurred and stamps were destroyed. The cry was taken up—'No taxation without representation.' The colonials had no members in

the parliament which voted the tax. Under Rockingham, the Prime Minister, the Stamp Act was repealed in 1766, William Pitt, now Earl of Chatham, rising from a sick-bed to make an historic speech sympathising with the colonies. However, parliament passed a Declaratory Act, maintaining its right to tax the colonies in all cases whatsoever. In 1767 with Pitt nominally at the helm, but really an invalid, Charles Townshend, the new Chancellor of the Exchequer, secured an import duty on tea, glass, and other articles, and sent to America the revenue so obtained to be employed in paying the royal governors and other officials in the colonies appointed by the Crown. Once more anger flamed in America. The colonials refused to buy Eng. tea. They smuggled it from Holland. The Eng. then made their tea cheaper than it was in England or than the smuggled tea. Still the colonials remained obdurate. In 1773 tea-laden vessels reached American ports. In Charleston the cargo rotted in storage. In Boston a band of men, disguised as Indians, boarded the tea ships and tossed tea chests into the sea. Samuel Adams had organised this coup, the famous 'Boston tea-party.' King George III. called upon parliament to pass drastic Acts removing the capital of Massachusetts from Boston to Salem, annulling the colony's charter, and providing that persons accused of certain crimes should be transported to England for trial. All the colonies prepared to stand by Massachusetts, and the famous Continental Congress was held at Philadelphia, Sept. 5, 1774. It was resolved to draft an appeal to the king, to the people of England, and the people of Canada. The idea of independence was disavowed. But it was still agreed they would not use any goods from England. The Americans were not without powerful champions in England. Lord Chatham and Edmund Burke in eloquent speeches spoke for their cause. Events now moved rapidly. General Gage was sent to Massachusetts with a military force and became both military and civil governor. The Americans were not overawed by the presence of a regular army. They were hardy men, used to an out-door life. As hunters and as Indian fighters and also as soldiers beside the Eng. they had become expert marksmen. They began drilling. They collected arms and stores of powder and bullets. Gage had been ordered to arrest Samuel Adams and John Hancock, two of the strongest leaders of the people. They were in Lexington in hiding.

On April 18, 1775, Gage sent 800 regulars to capture them and then go on to Concord and destroy American military stores. By midnight they were well on their way on their mission. But Paul Revere received the lantern signal from the North Church, telling him in which direction the British were going. Thus started his famous midnight ride to warn Adams and Hancock and arouse the Americans. The two men made good their escape. The British troops opened fire on a small body of Americans at Lexington, but in the fight which followed at Concord they lost 273 men and the Americans 93. The War of Independence had started. The second Continental Congress met in Philadelphia and appointed George Washington commander-in-chief of the American forces. But while recognising a state of war, it still disclaimed any intention of throwing off allegiance to the crown. At Boston the British were reinforced—by the arrival of Howe, Clinton, and Burgoyne with additional troops which raised the total forces to 10,000. The American army occupied the mainland and a force was sent to fortify Bunker Hill. Here on June 17, 1775, was fought a fierce battle in which the Americans were driven away at the point of the bayonet. On July 4, 1776, the Continental Congress passed its Declaration of Independence, largely written by Thomas Jefferson. Prior to that, in March, General Howe evacuated Boston, as Washington had meanwhile fortified Dorchester Heights and by heavy bombardment obtained the mastery of the city. It was one of Washington's finest achievements. Now began his real trials. His troops were not always dependable. They were poorly clad, badly fed, and inadequately supplied with arms and munitions. Howe had sailed from Boston to New York, where he was reinforced by the hated Hessian mercenary troops. The British had a succession of victories over Washington, who had followed them. They beat him at Long Island, White Plains, Fort Lee. They took Newark, New Brunswick, Princeton, and Trenton. But Washington held his little army together. On Christmas Day, 1776, he beat the Hessians at Trenton. A few days later he beat the army of Lord Cornwallis at Princeton. It was planned that three British armies should converge at Albany to cut off New England from the rest of the Federation. But St. Leger was defeated by Herkimer and General Burgoyne surrendered to Gates after the Battle of Saratoga. General

Howe led his troops towards Philadelphia, instead of up the Hudson R. In 1777 the famous Lafayette joined Washington. In February 1778 the American emissaries, fortified by the news of Burgoyne's surrender, concluded a treaty with France whereby that country was to come to the aid of the Americans and thus strike a blow at their old enemy, England. Also that spring, Lord North reversed his policy and induced parliament to pass laws enabling him to send peace commissioners to America. All the Americans had asked for and more was promised. But the terms were refused, because their alliance with France bound the Americans not to make peace except in conjunction with that country, with independence for America as an absolute condition. But late in 1777, prior to these events, the Americans had been defeated at the Brandywine and at Germantown and Howe had occupied Philadelphia, the cap. Washington took his 11,000 men into quarters at Valley Forge, 20 m. from Philadelphia, where he had nearly 3000 men unfit for duty, because they were barefooted and almost naked in the bitter winter weather. General Clinton succeeded Howe as commander of the British forces and was ordered to evacuate Philadelphia and return to New York. Washington hung on his flanks and the drawn Battle of Monmouth was fought June 28, 1778. It was the last general engagement fought on northern soil. Clinton occupied New York. Washington took up his position at White Plains near by and here the enemies remained watching each other for three years, while the real fighting took place in the S. At first everything went well with the Eng. They took Savannah. They beat Pulaski at Charleston, S. Carolina. Cornwallis beat Gates at Camden, S. Carolina. General Nathaniel Green succeeded Gates and adopted the Washington policy of retreating and wearing out his opponents. Tarleton, with his dashing cavalry, carried all before him until Morgan with his Americans finally beat him at Cowpens, Jan. 17, 1781. In 1781 Cornwallis with his British forces was in Virginia. Lafayette commanded the Americans. Washington and his army joined him. On Aug. 4, Cornwallis retired to Yorktown, Virginia. Now at last the Fr. brought troops and ships. Cornwallis found himself besieged and on Oct. 19 surrendered. As regards sea fighting, the Americans had built men-of-war and at one time 70,000 men were engaged in naval warfare. The outstanding hero was John Paul

Jones, a native of Scotland. Many of the battles he and his fellow-commanders fought were in British waters.

The peace treaty was signed at Paris, Sept. 3, 1783, the American commissioners being Benjamin Franklin, John Jay, and John Adams. Americans now had their independence, but their country was in a state of anarchy. The new nation was burdened with debt. Each state was jealous of its powers. Congress made every effort to function, but could not do so with success. At length Alexander Hamilton summoned a convention at Philadelphia to draft a constitution and form the permanent gov. for the new country. It met in 1787. Washington was there and Franklin. James Madison, afterwards President of the U.S.A. and often called the father of the constitution, was a conspicuous delegate from Virginia. The brilliant Hamilton, b. in the British W. Indies, was a delegate. Others were Robert Morris, who ruled the finances of the revolution; Gouverneur Morris, who invented the American decimal system of money; Edmund Randolph, the governor of Virginia; and John Rutledge, the orator. The constitution as finally drawn up was the result of a series of compromises (see under CONSTITUTION: *United States of America*). Adopted by the convention in 1787, there were vigorous contests before the various states ratified it, the last being Rhode Island in 1790. The actual voting for the first President and Vice-President took place in January 1789. There was no doubt who would be chosen as head of the state. By common consent there was only one possible man—Washington. John Adams was chosen Vice-President, New York City being the first temporary capital. Congress quickly settled down to the work of gov. It passed a Tariff Act to raise revenue. It enacted a law forming the President's cabinet. It created the Supreme Court of the country. In forming his cabinet, Washington disregarded political parties and appointed men favourably known to the people. Thomas Jefferson became Secretary of State, Alexander Hamilton Secretary of the Treasury, General Henry Knox Secretary for War, and, later, Edmund Randolph, Attorney-General. Hamilton proved himself the greatest Secretary of the Treasury the country has ever had. The burden he assumed was crushing. The country owed \$54,000,000, of which \$12,000,000 was due abroad, mainly to France. In addition to these war debts, the states had

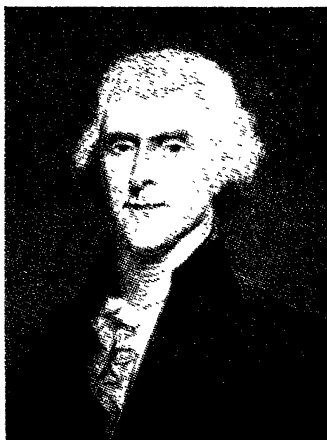
financed their own troops. This debt some of them had paid, but others had not and about \$21,000,000 was still due. Hamilton proposed to add this to the national debt. Then arose the question of deciding the permanent cap. of the U.S.A. Hamilton proposed a compact with Jefferson. If the latter would persuade his followers to assume the state debts, Hamilton would support Jefferson's choice of the S. for the capital. An agreement was reached and their followers in Congress put through the debt measure and also arranged for the cap. to be the present city of Washington. The national debt was funded and paid in interest-bearing bonds. In 1794 came the first real test of the new gov.'s power. Farmers in Pennsylvania resisted the excise tax on whisky. Washington called upon them to obey the law. When they refused, he sent to the governors of Pennsylvania, Maryland, New Jersey, and Virginia for troops. Soon 15,000 were on the march, and the rebellion collapsed. The terms of Washington as President saw the rise of political parties. Hamilton distrusted the people and was for a strong gov., Jefferson believed Hamilton was really in favour of turning the country into a monarchy. Hamilton believed Jefferson wanted the mob spirit to rule, as it did in the Fr. revolution. Hamilton founded the Federalist party, Jefferson, the Republican. The young republic, desiring nothing but to be left alone, was nevertheless involved in the troubles of Europe. Citizen Genet, the minister whom the Fr. revolutionary gov. sent to the U.S.A., sought to embroil the country in the Fr. wars, spoke insolently of the President, and appealed directly to the people. He was finally recalled at the American demand. England, engaged in a war with France, interfered with American neutral trade and impressed seamen of American vessels. John Jay was sent to England to negotiate a treaty. He succeeded in arranging that England should give up some western posts in the U.S.A. that it was still holding, but otherwise he secured practically no modification of many points of dispute. When the Senate passed the treaty and Washington signed it, he was shamefully abused, although a short time before he had unanimously been elected to a second term as President. Weary of public life and angered by the many attacks upon him in the opposition Press, Washington determined to retire to private life at the end of his second term. The first

real campaign for the Presidency now began. John Adams became the Federalist candidate. He had been America's first minister to England and had served well for eight years as Vice-President. Thomas Jefferson, the founder of the Republican party of that day (afterwards the Democratic party), became their candidate. He probably had the greater popular following, but Adams was chosen by the electoral college by seventy-one to sixty-eight votes, and Jefferson became Vice-President. Adams had hardly been seated as President before serious trouble broke out with France, whose gov. refused to receive the American minister. Adams sent a strong message to Congress and it answered him by making provisions to create a navy, fortify the harbours, and raise a force of militia. Meanwhile, three envoys had been sent to France and were told that the Fr. Directory would only receive them when the President's message was modified, a gift of money made to the Directory, and a large loan made to France for her war with England. In view of this reply the American gov. had no alternative but to make preparations for war with France, and Washington was appointed commander-in-chief of the forces. The Directory, however, did not wish to be embroiled with America and so made friendly overtures. Adams at once appointed a new minister, only to find himself enormously unpopular with the Americans for doing so. His administration had become odious also on account of the Alien and Sedition Laws. The Alien Act gave the President power to banish from the country, without giving any reason and without a trial, any alien he considered dangerous. The Sedition Law sought to silence the Press. Various state legislatures adopted resolutions cancelling these statutes and the Federalist party was torn in twain. In the election of 1800 Adams was again the nominee of the Federalists. Thomas Jefferson once more led the Republicans, the Vice-Presidential candidate being Aaron Burr. Bitter personalities were exchanged. The Republicans carried the electoral college by seventy-three to sixty-five, but there was no election, as Jefferson and Burr both secured the full vote of the Republicans. The duty of making the choice devolved upon the House of Representatives. Hamilton, Jefferson's life-long opponent, rendered a great service by throwing all his influence in favour of Jefferson, who was finally elected. His coming to the high office was the beginning

of the real democratic rule in America. It was a rapidly growing country over which he presided. The 1800 census showed a pop. of over 5,200,000, but one fifth were slaves. Virginia was still the most populous state, Pennsylvania second, New York third, Massachusetts fourth. Already the people had begun to look westward. More than half a million had settled in the Mississippi valley. The greatest of Jefferson's achievements was the famous Louisiana Purchase by which an empire was added to the U.S.A. at a ridiculously low cost. The vast region beyond the Mississippi, known as Louisiana, had originally been Fr. Then it was ceded to Spain, which gave it back to France under Napoleon in 1800. When Jefferson learned this, he was greatly alarmed. Lover of France as he had been, he feared France as a colonial neighbour. Napoleon saw how by one stroke he could get the money he needed for a new war, prevent England capturing Louisiana, and prevent Jefferson from becoming an ally of England. Hence he offered to sell Louisiana to the U.S.A. He asked \$20,000,000 and accepted \$15,000,000. The treaty was signed April 30, 1803. It added 1,171,931 sq. m. of territory to the U.S.A., a greater domain than the thirteen original states combined. But the purchase brought a series of tragic events in its train. With the carving of the Louisiana purchase up into states, the Federalists saw the W. and S. ruling the E. Hence they conspired to shatter the Union and set up a New England confederacy, adding thereto New York state. New York was Democratic, but the Federalists enlisted the support of Vice-President Aaron Burr, who was restless and dissatisfied. The Federalists offered to support him for the governorship of New York. Once more Alexander Hamilton stood in the way. Just as he prevented Burr from being President, so now he helped to defeat his candidature for the governorship. The conspiracy to break the Union was broken. Burr was thirsting for revenge and challenged Hamilton to a duel. On July 11, 1804, at Weehawken, New York, the men faced each other and Hamilton fell mortally wounded. Burr was denounced as a murderer. He fled to the Ohio valley and thence to the S., finally reaching New Orleans. He was now occupied with a new conspiracy, which was nothing less than to sever the Mississippi valley from the Union and make himself the head of it. However, he was ultimately tracked down in Alabama and brought to Richmond, Virginia,

for trial. The jury acquitted him on technical grounds. But the public believed him guilty. Things became so dangerous for him that he went to Europe. He returned in 1812, practised law and d. in semi-obscurity.

Jefferson had been triumphantly re-elected President in 1804. But fresh troubles soon assailed him. France and England were once more at war. Napoleon issued his famous Berlin Decree, England retorted by a decree closing all Fr. ports to neutrals. Between them England and France were paralysing American sea-borne commerce. Jefferson saw no way to make war upon



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the two greatest powers in Europe. On Dec. 22, 1807, he got Congress to pass one of the strangest Acts ever enacted into law. It was the famous Embargo Act, by which, for a time, all foreign commerce was forbidden. Jefferson believed the warring powers would abandon their decrees, because they needed American commerce. He was mistaken. It simply crippled American business. American farm products accumulated in warehouses and ships lay rotting in harbours. Then the desperate merchants began to trade with France through Florida and with England through Canada, but Jefferson took strict measures to enforce the law and his former great popularity waned. Six days before he retired from the presidency he signed an Act repealing the Embargo

Act. But even so eight state legislatures asked him to run for a third term. This he declined to do, saying it was well to establish a precedent. It was his example and his words that established the unwritten law that no President shall serve more than two terms. In 1808 Jefferson's Secretary of State James Madison, one of the chief framers of the constitution, was elected fourth President of the U.S.A. His difficulties began early. In the N.W. Tecumseh, a famous chief of the Shawnee Indians, was endeavouring to unite all the Indians so as to restrict further encroachments of the whites. The governor of Indiana, W. H. Harrison, a future President, made a treaty with some of the tribes in 1809 whereby they ceded three million acs. on the Wabash to the U.S.A. Tecumseh repudiated this and in 1811 Harrison with a small force defeated the Indians at Tippecanoe. Then came the culmination of the troubles with England which had been brewing for so long. England had sent a new minister to the U.S.A. to treat with the gov. on the outstanding vexed questions. But there was a new spirit abroad in Congress and it was evident that the Americans would be adamant unless the Orders in Council were repealed. Meanwhile, Congress was pressing Madison, a peace-lover like Jefferson, to declare war. The British Ministry was slowly yielding on all the points pressed by the Americans and the assassination of Perceval the Eng. prime minister on May 11, 1812, removed the last obstacle. The hateful Orders in Council, which so crippled American seaborne commerce, were repealed June 23. But weeks before the news of this repeal came to America, Madison had signed a declaration of war. In the autumn he was re-elected President after a severe contest, the Federalists being opposed to the war. The war opened badly for the Americans. Governor William Hull of Michigan territory was to invade Canada from Detroit. He crossed the frontier, but soon returned, and a British general of great energy, Isaac Brock, set out in his turn to invade the U.S.A. from Canada. On Aug. 16, 1812, Hull surrendered Detroit and with it Michigan territory without striking a blow. On the same day Fort Dearborn, on the site of the future city of Chicago, was taken by Indians who massacred the entire garrison. The Americans under Van Rensselaer crossed the Niagara R. into Canada to attack Queenstown, but were forced to surrender. If the Americans were unlucky on land, they were sur-

prisingly fortunate at sea. In a famous fight between the *Constitution*, fondly known by Americans as 'Old Ironsides,' and the British *Guerrière* the latter was pounded to pieces 800 m. from land and forced to surrender. The *United States* defeated and captured the *Macedonian*. Off the coast of Brazil the *Constitution* met the *Jarg* which was entirely destroyed. Then the tide seemed to turn. The *Shannon* engaged in battle with the American ship *Chesapeake*, June 1, 1813, and captured her. There were fights on both the Atlantic and Pacific Oceans, but gradually the superior might of the British navy began to tell and the main body of American war vessels were locked up in their harbours by superior forces lurking outside. But if the regular war vessels were locked up, the American privateers did considerable damage to the British merchant marine. A famous fight took place on Lake Erie, Sept. 10, 1813, in which a small Eng. fleet under Commodore Barclay surrendered to the American commander Oliver Hazard Perry. In the meantime, on land the American troops met with disaster in a fight at the R. Raisin, where they were not only beaten, but many of the men were massacred in cold blood by the Indian allies of the British. This rallied the men from Kentucky and the neighbouring regions and under General W. H. Harrison they invaded Canada and a battle was fought on the R. Thames, Oct. 5, 1813, which the Americans won. Tecumseh, the famous Indian chief, being slain. As a result of this victory, Michigan was once more held by the Americans and ended the war in that quarter. In the meantime Sir George Prevost with an army of 12,000 veterans of Wellington's army marched from the St. Lawrence Valley with the intention of invading New York State. He was supported by a fleet on Lake Champlain. An opposing American fleet, under Lieut. Thomas Macdonough, captured most of the British vessels and Prevost abandoned the campaign. But by now the British Gov. was able to display its true military power. Napoleon was, for the time being, locked up in Elba, thus releasing many veteran troops for American service. It was determined to strike at the heart of the country. A flotilla of ships reached Chesapeake Bay in Aug. 1814 and an army was landed which met the Americans at Bladensburg, defeating them. The way was open to Washington, the tiny cap. of the nation. It was easily captured. The Capitol where Congress sat, the White House,

residence of the American Presidents, and the navy yard were all put to the torch. Later other buildings were destroyed. It was now decided to march northward and take the important city of Baltimore. However, the troops were stopped by American resistance and the fleet could not get past Fort McHenry. It was during the bombardment of the latter that Francis Scott Key wrote the song which was to become the national hymn—'The Star-Spangled Banner.' The British fleet abandoned the campaign and sailed away with the troops. In the meantime, down S. in Alabama hostile Indians had committed a horrible massacre at Fort Mimms. Andrew Jackson, afterwards a famous President of the U.S.A., led Tennessee troops and defeated the Indians with great slaughter at Talladega. He was then made commanding general of all the southern territory. In the autumn of 1814 it became known that the British authorities had decided upon an attack on New Orleans with the object of capturing the entire Louisiana territory. Jackson hastened thither and put the city into a state of defence. It was none too soon. A British fleet of fifty vessels under Admiral Cochrane, with 16,000 veteran troops and a thousand heavy guns, was on the way. The army was under the command of General Sir Edward Pakenham, a brother-in-law of Wellington. The enemies met in front of New Orleans on Dec. 23 and 24, 1814, and fierce battles were fought without victory for either side. The British used hogsheads of sugar as a breast work and the Americans employed cotton bales. And now came one of the great tragedies of history. On Christmas Eve representatives of England and the U.S.A. signed a treaty of peace. On Jan. 8, 1815, when a ship was toiling through the Atlantic, bearing the good tidings, the American and British armies, all unaware of this, fought an engagement in which Sir Samuel Gibbs, Pakenham's second in command, and over 3000 Eng. officers and men were killed or wounded before the British force was evacuated. General Pakenham himself was killed after having two horses shot under him. It is just possible that, if Pakenham had been content to allow his plans to develop, he could have carried the American lines and entered New Orleans; but there was delay in crossing the riv. and he sent up the signal rocket to attack before his men on the west side of the riv. were ready. It was the last time American and British soldiers ever met as enemies. The treaty of peace which

had been signed at Ghent in Belgium was a document signed by two war-weary nations. All it did was to agree to stop the war. There was no cession of territory by either side. There was no written agreement about impressment of seamen and all the old disputes about boundaries, fishery rights and navigation of the Mississippi were left open for settlement at a later time.

In 1816 James Monroe (1758-1831), the last of a line of great Virginian occupants of the chief executive post in the U.S.A., was elected President, and again in 1820. Early in his first administration trouble broke out with the Seminole Indians, but was speedily ended by American troops under the celebrated Andrew Jackson. This brought the country into conflict with Spain, which still owned Florida (Britain having returned it in 1783). In 1822, however, Spain ceded that country to the U.S.A. for \$5,000,000 and by the same treaty the U.S.A. gave up its claim to Texas, which thus became Spanish territory. The U.S.A. was rapidly growing in pop. and the W. was being settled. A number of new states had been admitted to the Union, including Louisiana and Indiana. Now came the question of admitting Missouri. It was then that the slavery question became acute. The N. wanted to stop the admission of states in which slavery was allowed. The S. wanted exactly the opposite. Missouri was finally admitted in 1820 by the famous Missouri compromise (*q.v.*). By this Missouri was admitted as a slave state, but it was decreed that slavery should be prohibited in all the remainder of the Louisiana territory N. of 36° 30' N. latitude. This fight was the first ominous sign of the slavery problem becoming the absorbing issue which was finally to be settled by civil war. In Dec. 1823 Monroe signed the document which has made his name famous—the message embodying the Monroe Doctrine (*q.v.*). In S. America the various Spanish colonies had thrown off the Spanish yoke and set up as independent republics. The Holy Alliance of Russia, Prussia, and Austria, alarmed by this growth of republicanism, were considering aiding Spain to reconquer her lost colonies. George Canning, British Foreign Minister, proposed to the U.S.A. that his country and the U.S.A. issue a joint declaration against alien interference in S. American affairs. Monroe was willing, but his Secretary of State, J. Q. Adams, said the U.S.A. should do it independently. Largely drafted by Adams, but signed by Monroe, a message was, therefore, sent to Congress, laying it down as a

principle that the American continents were henceforth not to be considered as subjects for future colonisation by any European powers and that any attempt on their part would be considered as dangerous to the peace and safety of the U.S.A. Never fully acknowledged as international law, it has nevertheless ever since been a guiding principle of American policy for which the U.S.A. would quickly go to war if necessary.

The election of 1824 resulted in Andrew Jackson getting the most votes in the electoral college, but not a majority over all the other candidates (see JACKSON, ANDREW). His nearest opponent



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was John Quincy Adams (1767-1848), son of the second President of the U.S.A. The election of a President was therefore thrown into the House of Representatives and Adams was chosen. He was never popular, both Houses of Congress were against him, and no administrative measure of any importance was passed. In 1828 he ran for re-election, but was heavily defeated by Andrew Jackson (1767-1845), the hero of New Orleans and one of the greatest leaders the Democratic party ever had. In every sense of the word he was a self-made man. In 1828 a Bill was passed known as the Tariff of Abominations. In 1830 in the Senate the slavery question had once more occasioned a great debate. Some of the best

orators of the S. had hinted at nullification of the country's laws and at disunion. Daniel Webster, in a famous speech, argued that the Constitution was supreme and ended with the burning words: 'Liberty and Union, now and forever, one and inseparable.' Not only was the S. exercised over slavery, but it bitterly resented the Tariff Bill. Especially in S. Carolina was there talk of nullification. A compromise on the tariff was arranged by Congress, but at the same time Jackson sent troops into S. Carolina to enforce the tariff law. In the Presidential election of 1832 Henry Clay (*q.v.*) opposed Jackson. The issue between them was the United States Bank under whose charter and powers the financial control of the nation rested. Jackson was its violent opponent, believing it was corrupting the politics of the nation, and on this issue was overwhelmingly elected. On his own authority he removed from the bank the U.S. deposits and thus ruined it. There were appeals from the business men and hot debates in the Senate, but Jackson stood firm. He practically dictated the Presidential nomination of Martin van Buren (1782-1862) by the Democratic party in 1836. Van Buren had been his Secretary of State and later Vice-President. Shortly after his induction into office came the great panic of 1837. His political opponents blamed the Democratic party for this. In 1837 van Buren urged the creation of an independent treasury of the gov. itself, to take the place of the U.S. Bank, and this finally became law in 1840. In the same year, van Buren was re-nominated for the Presidency by the Democrats. The Whigs nominated William Henry Harrison (*q.v.*) (1773-1841). John Tyler (*q.v.*) was nominated for Vice-President. Harrison was easily elected. But he *d.* exactly one month after being inducted into office and Tyler (1790-1862) succeeded him. An outstanding feature of his administration was the Webster-Ashburton Treaty between the U.S.A. and England whereby the boundaries between Maine and New Brunswick, Canada, were settled. Then arose the troublesome Texas question. In 1827 Mexico had freed her slaves, but her northern prov. of Texas refused to do so and in 1836 declared her independence which was recognised by the U.S.A. and by some of the European powers. The Mexicans invaded Texas and in 1836 occurred the terrible massacre of the Alamo, in which the celebrated frontiersman, Davy Crockett, was killed. General Santa Anna led the Mexican troops in the Battle of San Jacinto and was

routed by General Sam Houston, formerly a governor of Tennessee. Texas now applied for admission as a state of the U.S.A., and in 1844 Tyler sent in a treaty annexing Texas, but the Senate rejected it. The Texas question thus became a main issue in the 1844 presidential campaign. The Democrats pronounced for the immediate annexation of Texas and for the occupation of Oregon. There was a dispute with Great Britain about this territory. The Democrats insisted that the boundary must be $54^{\circ} 40'$ N. latitude. The Texas programme appealed to the S.; the Oregon proposition to the N. The Whigs unanimously nominated Henry Clay for President. A third convention nominated the outgoing President, but he soon withdrew. After an exciting election, James K. Polk (1795-1849) was chosen. The Texas matter had been settled before Polk took office. Congress passing a joint resolution to annex that vast territory and admit it to the Union. But Polk announced an ambitious programme and carried it out. A Bill recreating an independent national treasury became law in 1846 and in the same year Polk signed a Tariff Bill which lowered many of the duties in the old Whig Tariff Bill. He now turned his attention to the Oregon problem involving the great territory in the N.W. from the Rocky Mts. to the Pacific, lying between 42° and $54^{\circ} 40'$ N. latitude, which had been occupied jointly by England and the U.S.A., either country having power to give one year's notice to terminate the arrangement. Polk gave this notice in 1846 and a compromise was arranged. Instead of $54^{\circ} 40'$, the boundary line was fixed at 49° N. latitude, the U.S.A. thus securing 300,000 sq. m. of territory and England securing for the future Canada a sea-coast on the Pacific and the whole of Vancouver Island. The last item in Polk's programme was the acquisition of California. California belonged to Mexico and that country refused to sell it. There lay the way of war and conquest. Occasion for this was found in the dispute between the U.S.A. and Mexico over their boundaries. Here Polk made a costly blunder. General Santa Anna, who had been President of Mexico, had been driven into exile by his people. Polk had him conveyed back to Mexico in a war vessel, thinking he would seize power and, out of gratitude, treat with the U.S.A. for the cession of California. Santa Anna soon came into power, but found that he could assure it by warring on the Americans. He was encour-

aged in this by the belief that the U.S.A. and England were about to fight over Oregon. Polk had sent General Zachary Taylor with an army of occupation into the disputed Texas territory. On May 5 and 9, 1846, a Mexican army fought the Americans at Palao Alto and Resaca de la Palma and was beaten, some Americans being killed. Polk now declared war on Mexico. Taylor marched into Mexico and took Monterey. General Winfield Scott, head of the American army, went to Vera Cruz, Mexico, by sea and was ordered to march overland to the Mexican cap. In the meantime, the Battle of Buena Vista was fought Feb. 23, 1847, resulting in the total rout of the Mexicans. Scott now began one of the most successful campaigns in history. He landed at Vera Cruz, March 9, 1847, took the town after five days' siege and then started for the interior. In turn the battles of Contreras, San Antonio, and Churubusco were won. The strong stone castle of Chapultepec was taken by storm and on Sept. 14, Scott and his army marched into the anct. cap. of the Montezumas. The treaty of peace, signed Feb. 2, 1848, ceded to the U.S.A. the territory which is now the states of California, Nevada, and Utah and parts of New Mexico, Arizona, and Colorado. Only nine days before the treaty was signed gold was discovered in California, and the famous gold rush began which in two years increased the population of that state to 100,000. Zachary Taylor (1784-1850), nominated by the Whigs, was elected president in 1848. The slavery question was at once a thorn to the new chief executive. California was claiming entrance into the Union and in 1849 adopted a state constitution excluding slavery. Taylor was a southerner and slave-owner, but he recommended that California be admitted as a free state. Enraged southern statesmen freely spoke of dissolution of the Union. The year 1850 was a fateful one. The great issue was to be debated by the greatest Senate in the history of the country. The famous leaders Clay, Calhoun, and Webster were still members. So, too, was Stephen Douglas, the celebrated 'Little Giant' from Illinois; Seward of New York, afterwards to be in Lincoln's cabinet; Salmon P. Chase, afterwards to be on the bench of the Supreme Court, and Jefferson Davis, destined to be the first and only President of the Confederacy. Clay brought in his famous compromise measures which provided, among other things, for the admission of California as a free state, prohibition of slavery in the District of

Columbia, where the cap. was situated, and a new fugitive slave law. In an historic debate Clay made the last great speech of his career. Calhoun, a dying man, heard his own speech read by a friend. Webster, hope of the N., injured his enormous popularity by saying the S. had some just grounds for complaint. Seward took a strong northern standpoint and thus made himself the leader of Northern thought. While the debate was still pending, President Taylor became suddenly ill and d. July 9, 1850. He was succeeded by the Vice-President Millard Fillmore (1800-1874). Also a self-made man, he was



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regarded a northern man with southern principles. He soon proved this to be true. He offered Webster the post of Secretary of State and it was accepted. Many of his other appointees were from the S. California was admitted as a free state, but the fugitive slave law was also adopted. In many northern states there was covert rebellion against the law. The people assisted hunted slaves to cross into Canada where they were safe. Others escaped from slave states to the free states by the famous 'underground railroad.'

In the presidential election of 1852 the main issue was the Fugitive Slave Law. The Democrats nominated Franklin Pierce (1804-69), a native of New Hampshire, who had been a member of both Houses of Congress, and a brigadier in the Mexican War. The party platform endorsed all the compromise measures, including the Fugitive Slave Law. The Whig convention was in trouble from the start because the Southern Whigs insisted

that the Fugitive Slave Law be dorsed. This was finally done; then Winfield Scott was nominated. But this prejudiced the Whig party chances, because some years previously Scott had indicated that he favoured the ultimate abolition of slavery. Pierce carried all the states except four, thus obtaining one of the most sweeping victories in American history. It was the death blow to the Whig party, whose President was Fillmore. Pierce began well. His appointments of Mar. ex-Governor of New York, to Secretary of State, Jefferson Davis (afterwards President, and, as already stated, the only President of the Confederacy), Secretary of War, and Caleb Cushing as Attorney General were popular. But he soon lost popularity. A Northerner, he favoured the S. in every question regarding slavery and was a determined opponent of the abolitionists. He wanted to add Cuba to American territory. The ministers he sent to England, France, and Spain met at Ostend in Belgium and issued a famous Ostend manifesto in which they urged that Cuba be transferred to the U.S.A. by purchase, if possible, or, if that failed, annexed by force. But the manifesto proved a fiasco for England and France were bitterly opposed. Despite this failure, he seemed as if the country would have a successful administration, but this moment a startling move was made by Stephen A. Douglas against the Missouri Compromise Bill. He brought in a Bill which maintained that it was the purpose of Congress that all future territories and states admitted on the same principle, and that the people themselves should decide for or against slavery. Secondly, he maintained that the Missouri Compromise Bill, whereby territory N. 36° 30' was to be free soil, was unconstitutional. While the storm over this was still brewing, Douglas introduced another Bill virtually repealing the Missouri Compromise which he stood as a treaty between N. and S. for over thirty years. In an appeal to the people the Free Soil Democrats bitterly assailed the Bill. Douglas, however, with consummate ability as an orator and parliamentarian, secured its passage through the Senate. It was also passed, after a fierce debate in the House of Representatives. Throughout the N. mass meetings and legislatures denounced the Bill, and condemned Douglas as Judas. Douglas had, in fact, changed the face of national politics. His action alienated Northern states which had hitherto been Democratic and it paved the way for the new party.

which, known later as Republican, was destined, from the time of Lincoln onwards—except for the terms of Cleveland and Wilson—to rule without intermission. The Republican party really had its inception in Ripon, Wisconsin, March 30, 1854, where the citizens called for the formation of a free soil party to be known as Republican. In the autumn, under various names, but all opposed to the Nebraska Bill, organisations were successful in most of the Northern states and the Democratic majority in the national House of Representatives was converted into a minority. After the anti-slavery protagonists organised the House, a real convention was held in Pittsburgh and the Republican party was formally founded as a national party.

In the presidential campaign of 1856 the Democratic convention nominated James Buchanan (1791–1868), who had been Minister in England, and the platform endorsed the Nebraska Law. The Republicans nominated John C. Fremont, famed for his explorations of the Rocky Mountains and his part in driving the Mexicans out of California, and his supporters made political capital with their punning slogan—‘Free speech, free soil, and Fremont.’ Buchanan, however, was elected, carrying ten Southern and five Northern states, while Fremont carried all the rest of the N. Buchanan had hardly been inducted into office before Kansas became the focus of attention. After the Nebraska Bill was passed, people from Missouri poured into Kansas for the purpose of making it a slave state; and to offset the efforts of the Missourians to make Kansas a slave state Northern men sent large bodies of immigrants into the territory, determined to make it free soil. The free-soilers framed a constitution making Kansas a free state and it was ratified by the people, the pro-slavery party ignoring the election of a territorial legislature. However, under this constitution, a free-soiler was chosen governor, but Pierce denounced the whole thing and dispersed the legislature with troops. There was a state of things approaching civil war in Kansas. John Brown (q.v.), the abolitionist fanatic, led a night raid of free-soilers on the village of Pottawatomie and killed some pro-slavery adherents. This was known as the massacre of Pottawatomie. After that rival armed bands roamed the state and made war upon each other. Buchanan appointed R. J. Walker of Mississippi governor of Kansas. Walker was not only a

Democrat but a slave-owner, but he would have no part in the pro-slavery machinations. A pro-slavery convention met at Lecompton and produced a constitution which in effect meant that Kansas would be a slave state. Walker had promised the people a vote on it. Buchanan had supported him. But now he broke his word and prepared to force the admission of Kansas with the Lecompton constitution. He sent the constitution to Congress and urged that Kansas be made a state under it. It was at this juncture that Douglas, who now saw that the Nebraska Bill had been a mistake, entered on the scene. Defying the President and his party, he opposed the Kansas constitution in one of the finest speeches of his life. It made him once more the favourite of the Northern Democrats and it defeated the Bill not in the Senate, where he spoke, but in the House. Later the people had a vote on the constitution and crushingly defeated it. At the opening of the Civil War, which was so near, Kansas was finally admitted as a free state. (*See also* DRED SCOTT CASE, THE.)

On Oct. 17, 1859, a crowd of abolitionists and negroes seized the U.S. arsenal at Harpers Ferry, Virginia, and there were reports, ill-founded as it happened, of an insurrection of slaves in Virginia. The gov. sent forces under Colonel Robert E. Lee and his aide J. E. B. Stuart, both destined to be great figures in the Confederate armies. After two of his sons had been killed at his side, the leader of the attack on the arsenal was captured. It was John Brown of Pottawatomie. He was tried for treason and murder and hanged.

Then came the most momentous election in the history of the U.S.A.—the presidential campaign of 1860. The Democrats were divided among themselves. The Northern delegates to the party convention adopted a platform which declared that the question of slavery in the territories should be decided by the courts. The result was that Alabama, Mississippi, Louisiana, Arkansas and S. Carolina seceded from the convention. Those who remained fruitlessly balloted for a Presidential nominee and then decided to adjourn and meet again at Baltimore. The seceders decided to meet at Richmond, Virginia. In the meantime, the Republicans had nominated Abraham Lincoln (1809–65) on a platform which pronounced slavery an evil and denied the right of Congress to give legality to slavery in any territory. The Baltimore convention of Democrats now met. More Southerners seceded. The

rump convention nominated Douglas for President. The seceders joined the other convention at Richmond and nominated John C. Breckinridge of Kentucky. Still another party, calling itself the Constitutional Union party nominated John Bell of Tennessee. The election of Lincoln seemed certain, unless the divided Democrats united on one man. Lincoln obtained 180 votes in the electoral college, 152 being enough to elect. Breckinridge obtained 72, Bell 39, and Douglas 12. Lincoln had swept the N. But the forces of upheaval were now at work and the nation was approaching its greatest ordeal. The threats of secession made by Southern orators for forty years were about to be realised. Some months before Lincoln was inaugurated as President, the S. Carolinians held a convention arising out of which, on December 20, 1860, they formally passed secessionist resolutions. They repealed the Act of 1788 by which their state had adopted the constitution and proclaimed the union between S. Carolina and the U.S.A. at an end. Mississippi, Florida, Alabama, Georgia, Louisiana, and Texas soon followed their example at similar conventions. The seven states held a joint convention at Montgomery, Alabama, February 4, 1861, adopted a temporary constitution and chose as provisional President and Vice-President Jefferson Davis and A. H. Stephens of Georgia respectively. The latter had opposed secession and later joined only out of loyalty to the state. The whole move seemed fantastic to the people of the N. in view of the Republican pledge that they would not interfere with slavery where it already existed, and the further fact that both Houses of Congress were still Democratic. While these events were in progress, President Buchanan vacillated in his policy. In his message to Congress in December 1860 he held that the election of an anti-slavery President was no ground for secession. But he also denied that the gov. had power to prevent secession. Later, when his cabinet was reorganised with stronger men in it, he said that it was his duty to collect the public revenues and to protect public property even if force were necessary. In the meantime, in that dark winter, frantic efforts were made to avoid the coming armed conflict. In both the Senate and House of Representatives measures were proposed to restore the old line of 36° 30'. S. of that line there was to be no interference with slavery. It would have perpetuated slavery in the U.S.A. These measures failed in

both bodies. Colorado, Nevada, and Dakota were organised as territories without a word being inserted regarding the slavery question. . . state after state seceded, the Senators and Congressmen withdrew from Congress, many of the uttering farewell speeches in which they hinted that there could be no peaceful relations between the 'two nations.' In many of the Southern States forts, arsenals, and munition supplies belonging to the national gov. were taken over by the Southerners. Before Buchanan left office this was the case everywhere with few striking exceptions, the chief of which were the forts guarding the harbour of Charleston, S. Carolina where secession began. Here Major Robert Anderson left Fort Moultrie and took its guns to the stronger Fort Sumter, where he prepared to hold out with the regular American soldiers. Buchanan sent the *Star of the West* to carry further ammunition supplies, but it was fired upon by the shore batteries in charge of S. Carolinians and driven away. These constituted the first shots in the war. In March 1861 Lincoln was inaugurated as President. Still a lover of peace, still hopeful of preventing a terrible internecine strife, in his speech he affirmed that he did not propose to interfere with slavery where it already existed. He said he would uphold the Fugitive Slave Law. He even said he would support a proposal made in the House of Representatives to add an immutable amendment to the constitution which would make slavery perpetual in the states where it already existed. But he also said that the Union was intact and must remain so. He asserted that no state could withdraw from the Union, and that it would be his duty to preserve, protect, and defend the Union.

A little more than a month later, Lincoln, against the advice of a majority of his cabinet, decided that Fort Sumter must be relieved, and in accordance with a promise made to the Governor of S. Carolina, he notified him, on April 8, 1861, of his intention. The Confederate cabinet was also divided as to its action, but militant counsels finally prevailed and General P. G. T. Beauregard, who had resigned his post in the American army and was now in charge of the Charleston forces, was ordered to take the fort. The bombardment began on April 12 and thirty-four hours later the fort was surrendered. Two days later Lincoln struck hard. He issued a call for 75,000 troops. Northern Democratic leaders rallied to the cause. Former

President Buchanan gave his support, as did Senator Douglas. In the S., Virginia, which had at first been against secession, now joined the Confederacy and soon all the eleven real Southern states were united. There were four border states which were also slave states—Delaware, Maryland, Kentucky, and Missouri. Especial efforts were made by the S. to win Missouri and Kentucky. The governors of those commonwealths favoured secession, but their legislatures defeated them. Kentucky was more vitally torn than any state in the Union. Practically all its manhood went to war, part for the N. and part for the S. Brothers were against brothers and fathers against sons.

In the conflict which was now beginning the N. had certain great advantages which were bound ultimately to weigh decisively in the balance. It had four times as many white people as the S. It had greater wealth. It was immeasurably more advanced in manufactures, the S. being mainly agricultural and dependent for most other things on purchases from the N. and from Europe. The N. also had better railway lines. It was completely self-contained. It could meet all its own needs and those of its armies. If there was to be a war of attrition, the N. numbers would tell.

What advantages the S. had told mainly in the early stages of the war. Some of the most brilliant men in the old regular American army were Southerners and cast in their lot with the S. It took years before Lincoln eventually found the generals he had so anxiously sought. The men of the S. were mainly given to the outdoor life, and were harder than the bulk of the first Northern recruits who came from the populous cities. The Southerners were used to fire-arms. They had a dash and élan resembling that of the Fr. But in the end, when the troops of the N. were properly led and trained, they showed steadiness and fought with dogged resolution and remained undismayed by defeat. The N., too, had the stronger navy and soon had command of the sea, enabling the gov. to blockade the Southern ports. They thus cut off its export of cotton and tobacco and prevented the S. from securing from Europe those things of which it soon stood in dire need. By clever diplomacy, too, the men who represented the N. in Europe prevented any country in the Old World from recognising the Confederacy as an independent nation. Thus the decisive factors lay mainly with the Union.

If Lincoln called for 75,000 troops, Davis asked for 100,000 and at the same time moved the cap. to Richmond. It was an act which was to bring about some of the fiercest fighting on the soil of Virginia, where for years the Northern soldiers tried to capture Richmond, while the Southern armies threatened Washington. The first real clash at arms came on July 21, 1861, between the Northern army under General Irving McDowell and the Southerners under Beauregard. The Confederates were at first driven back to a point where General T. J. Jackson held his brigade awaiting the oncoming Union soldiers. The fighting was now renewed and the Union forces soon became a beaten army, the panic-stricken soldiery retreating 30 m. until they were swarming in the very streets of Washington. This Battle of Bull Run fired the S. with joy and deeply depressed the N. While the fighting was going on in Virginia and Missouri, relations with England assumed the first importance. Public opinion in England was divided. Some of the more influential people favoured the S., particularly as Lancashire needed Southern cotton. But there was a very powerful public which was bitterly opposed to slavery. There was dismay in the N. when on May 14, 1861, a proclamation of neutrality was issued by England which accorded to the Confederacy belligerent rights such as are granted to a sovereign nation. Most of the European nations soon followed. Nor was the situation improved when the so-called Trent affair occurred. (See TRENT AFFAIR.) But the N. was beginning to gather its might. Nearly half a million men had come to the colours when only about half that number had responded so far in the S. On March 9, 1862, was fought an indecisive naval battle between the *Merrimac*, a converted Confederate ironclad which had sunk the *Cumberland* and *Congress* in Newport News, and the *Monitor*, a new ironclad built for the N.

By 1862, the objects of the N. had widened. Kentucky became the scene of various engagements and the first advance towards the S. was begun. Albert S. Johnston, one of the most brilliant men in the Confederate armies, was in charge. Opposed to him was U. S. Grant (q.v.), who had been in the regular army. After several bloody battles and a brief investment, Grant captured Fort Donelson on the Cumberland R. Two Confederate generals had left the place and given to General S. B. Buckner the task of defending it against odds. Buckner offered

to capitulate. Grant demanded unconditional surrender. Buckner, forced to accept, gave up an army of 14,000 men. The way was now open for a southward advance and Grant moved his armies farther along the Tennessee R. The opposing forces met in battle at Shiloh on April 6, 1862. The first day's fighting favoured the Confederates, but cost the life of A. S. Johnston, who was struck down while cheering on his men. In the second day's fighting the Union forces won and the Confederates retreated to Corinth. One of the results of this battle was that Grant discovered in W. T. Sherman one of his ablest lieutenants, and from that time on assigned to him some of his most difficult tasks. Another great blow was struck at the Confederates when a fleet under David G. Farragut, one of the greatest of American naval commanders, ran past the forts protecting New Orleans and captured that great Southern city.

In the E. the peninsular campaign was in full swing. George Brinton McClellan, young, handsome, and an effective trainer of men, whose affections he invariably won, had been made commander-in-chief of all the Union armies. But McClellan had one incurable fault. He was prone to delay. In February 1862 Lincoln ordered a general advance. McClellan prepared his plan which involved an advance from the peninsula formed by the James and the York with the object of capturing Richmond. He was then relieved of his post as commander-in-chief and relegated to the command of the army of the Potomac which he had formed. At last in mid-March he set forth and in three weeks had his army of 121,000 men safely 200 m. away, based upon Fortress Monroe and ready for the 75 m. march on Richmond. He met the Confederates at Yorktown. His army was weakened by the sudden withdrawal of 25,000 men to defend Washington. In these circumstances McClellan settled down for a siege, only to find that the enemy had retreated. He met them in battle at Williamsburg, where once more the enemy retreated towards Richmond. McClellan was now ready to move, when the officials at Washington conceived the idea of crushing Jackson who was in the Shenandoah valley. President Davis quickly sent reinforcements to Jackson. That great soldier defeated Banks at Winchester, evaded the other two Union armies which were seeking him, and triumphantly led his men back to join the forces in line near Richmond. In the mean-

time, on May 31 and June 1, McClellan's army fought a great battle at Fair Oaks. At first it seemed as if the Union force had lost the day but the sudden and timely arrival of a new corps changed things and the Confederates were put to flight. The Union losses were 5000 and the Confederate 6000—making it one of the fiercest battles so far fought. McClellan was now only 6 m. from Richmond, but the swamps of the Chickahominy lay between and saved the cap. for the time being. Now a new commander came upon the scene, destined to win immortality—Robert E. Lee, the *beau idéal* of the Virginia gentleman. He had been military adviser of President Davis because of his military training and distinguished career. In the Battle of Fair Oaks, the able J. E. Johnston in command of the Confederates had been severely wounded. Davis now appointed Lee as commander-in-chief of the Southern armies, a post which he held until the end. Lee was quick to take advantage of the pause in McClellan's movements. He rushed up reinforcements from all over the S. until he had an effective fighting force of 90,000 men against his enemy's 100,000. Then ensued the Seven Days' Battles (*q.v.*). Severe engagements were fought in the last days of June at Mechanicsville and Gaines Mill, and on July 1 was fought the Battle of Malvern Hill. With fortune favouring now one side now the other, the Union forces settled down at last on the Bank of the James R., while Lee withdrew to the defences of Richmond. Once more McClellan was ready to attempt the capture of Richmond. He was now sure of his army. It had been sorely tried and its spirit was unimpaired. But all his plans were rendered nugatory, because the gov. ordered him to return with his army to cover Washington. There was dissatisfaction in the N., but there was really not much cause for complaint. Kentucky and Missouri had not seceded. Arkansas and Tennessee had been taken by Union forces. New Orleans was in Union hands. Had they but known it, the Union leaders were already in process of encircling the Confederacy. Still searching for generals who could win big victories, the administration made General Halleck commander-in-chief and gave General Pope the best part of McClellan's army. But the first battle-news was discouraging. On Aug. 29, 1862, was fought what is known as the second Bull Run and again the Union armies were beaten. Another defeat at Chantilly completely destroyed Pope's reputation as a

general. Lincoln called in person on McClellan and asked him to take charge of the army at the Potomac once more. Generously forgetting his treatment in the past, McClellan returned to his delighted troops. Lee had now moved into Maryland, thinking to win that state to the Confederacy, to capture Baltimore, and then advance into Pennsylvania, thus carrying the war into Union territory. After several minor battles the stage was now set for the great struggle at Antietam, September 17,

September 22, 1862, he issued his famous proclamation of emancipation. It declared that the slaves in all states in rebellion against the gov. should be free on and after January 1, 1863. The reaction in Europe was immediate. Nations, which cared little about what happened to the Union, were heartily in sympathy with the abolition of slavery. It for ever settled where England would stand. But there was a dangerous reaction in the N. itself. The Democrats made big gains in the



THE DIVISION OF NORTH AND SOUTH

(A reproduction of the famous *Punch* cartoon)

1862. The battle was drawn, 23,000 dead being left on the field. Lee retreated across the Potomac and McClellan, as usual, delayed in following his enemy. He was now relieved for good and his career was ended. Lincoln then took one of his most important steps. Hitherto he had merely struggled to preserve the Union intact. The slavery question had been held in abeyance for fear of alienating the Democrats in the N. and the people in the border states. At one time he had urged Congress to arrange for the freedom of the slaves with compensation to the owners. But now, on

November elections and it was only New England and the border states which kept the House of Representatives Republican.

In the autumn of 1862 Rosecrans, who superseded Buell, won victories at Corinth and Murfreesborough and most of Tennessee was in his possession. In the E. on December 13, 1862, Lee severely defeated Burnside in the bloody Battle of Fredericksburg. In the first days of May the Confederates once more won a great battle at Chancellorsville, but it cost them the life of one of their greatest men, Stonewall Jackson. Attention was now focussed on the

W. where Grant had conceived the idea of taking Vicksburg, Mississippi. After various failures he at last invested Vicksburg with his army and a fleet of ironclads which risked the peril of the city's gunfire. The siege lasted six weeks and on July 4, 1863, the town was surrendered with 37,000 prisoners and large stores of rifles and cannon. While the siege was still in progress, the greatest battle of the war was fought at Gettysburg, Pennsylvania. It was the high tide of the war. From that time on the cause of the Confederacy was ruined beyond redemption. Flushed with his victories at Fredericksburg and Chancellorsville, Lee had determined once more to invade the N., and took his army of 100,000 into Pennsylvania. He met the army of the Potomac, now under General George Meade, at Gettysburg. The enemies were of about equal strength. For three days, July 1-3, 1863, the battle raged with the greatest artillery fire ever known in the U.S.A. The culminating point came when General Pickett led 15,000 picked men, the very flower of the Confederate army, in a desperate endeavour to take Cemetery Ridge, the centre of the Union positions. It resulted in the decimation of the gallant attacking force and the battle was lost; Lee retreating to Virginia.

In September 1863 Bragg beat the Union forces under Rosecrans at Chickamauga in Tennessee. Then followed the Battle of Lookout Mountain, 3000 ft. above sea-level and often called 'The Battle of the Clouds' because those below could not see the carnage on the peaks. The Confederates retreated to Georgia. These last battles had been fought with Grant as commander-in-chief. He was now the most popular soldier in the Union and in February 1864 Lincoln made him Lieut.-General in charge of all the armies. Grant now planned the ending of the war. He knew it would be costly, but he adhered to his plans unflinchingly. He himself would face Lee in Virginia, seek to destroy his army, and take Richmond. At the same time he would send Sherman to face Gen. J. E. Johnston in Georgia. It was a great conception and it succeeded, although its consummation took over a year. In May 1864, with Lee and Grant facing each other, began the battles of the Wilderness of Virginia and of Spottsylvania, indecisive as to results. On June 3, 1864, the enemies met at Cold Harbor and here in less than an hour over 12,000 Union soldiers were killed or wounded. Grant had lost 60,000 men in this

campaign to 40,000 for the Confederates. But he knew that the S. could not replace its losses in manpower whereas the N. could. In the early autumn months General Sheridan won victories at Winchester and Cedar Creek and then laid waste the entire Shenandoah Valley, so that never again during the war was there any serious danger from that quarter. While Grant was fighting in the Wilderness, Sherman began his march from Chattanooga. Johnston was a cunning foe and a number of indecisive battles were fought. President Davis then replaced Johnston by General J. B. Hood who, however, was not the equal of Johnston. He was forced steadily back until on September 2, 1864, Sherman entered Atlanta. In the meantime, in August, Admiral Farragut had won his famous victory of Mobile Bay which had been the harbour for the Confederate blockaders, a victory which destroyed the Confederate fleet. In November, after great opposition in his own party, Lincoln was re-nominated for President by the Republicans and Andrew Johnson, a war Democrat from Tennessee, was nominated for Vice-President. General McClellan was nominated by the Democrats. Everywhere now the N. had been winning battles. Hence Lincoln was easily re-elected by 212 electoral votes to 21 for McClellan. Less than two weeks after the election, Sherman set out on his famous march to the sea from Atlanta. 62,000 strong, in four parallel columns, the army accomplished the 300 m. journey, leaving a great swathe of destruction in its wake. On December 21, Sherman entered Savannah, without having to fire a shot. General Thomas won the Battle of Nashville in December 1864 and thus drove the last of the Confederates out of Tennessee. In January 1865 Wilmington, N. Carolina, was taken by joint naval and military action and the last remaining port of the Confederacy was now closed. Sherman began his march back from the sea. Columbia in S. Carolina caught fire and was burned down. Charleston was deserted by the Confederates, who set fire to the cotton, lest it fall into Union hands. The fire spread and the city was in ruins. Farther N. went the armies of Sherman until they were now almost ready to join Grant. On February 3 an abortive attempt at peace was made, A. H. Stephens, Vice-President of the Confederacy, meeting Lincoln at Fortress Monroe. The President was inflexible in his terms. The Union must be restored and slavery must end. So the fighting was renewed. The end was

in sight. Grant, with his superior numbers, was encircling Petersburg and Richmond. On April 2, the Union forces attacked Petersburg and captured it with 12,000 prisoners. At length, on April 3, 1865, the Union armies entered Richmond. Lee now thought of escape from the trap, so that he might join forces with Johnston, but he was completely surrounded. At Appomattox Court House on April 9 he surrendered. The number of his army had been reduced to a bare 28,231. The terms granted by the victorious Grant released the officers and men on their parole not to fight again unless properly exchanged. His next order was to feed the half-starved army which had surrendered. Johnston surrendered his army to Sherman on April 26 and by the last of May all the rest of the organised forces in the far S. had also laid down their arms.

In this costly and bloody civil war half a million lives had been lost, while tens of thousands of soldiers returned with health permanently impaired. The public debt of the Union had risen to nearly three billion dollars. What it cost the Confederacy has never been definitely estimated. And the Civil War continued to cost the Union vast sums paid out in the form of pensions which seemed to increase rather than decrease as the years went on. Despite all this, the N. was stronger than ever. The S. was ruined and prostrate. It had lost everything save honour and military glory. The dreamed-of independence as a new nation had vanished. The slaves were gone, with no compensation to the owners. A ghastly wake of ruin and desolation lay over a once smiling and fair country. Even with the coming of peace the thorny road of the S.'s Calvary was not at an end: it was to endure for another ten terrible years under the so-called Reconstruction. The indignities, the hatefulness, the vindictiveness of those ten years were to be so indelibly branded in Southern memories that it is perhaps true to say that real union between the sections was not really attained until the Spanish-American War when a Republican and Northern President, William McKinley, had the courage and inspiration to call to high command some of the last notable surviving figures of the old Confederate army.

The general rejoicing in the N. over the termination of the terrible contest came to a sudden end when on the night of April 14, 1865, President Lincoln, while attending a theatre, was shot by a demented actor, John Wilkes Booth. The next day Lincoln died. Booth thought he was aveng-

ing the S. In fact, he struck it one of its deadliest blows. Long before the Union had won, Lincoln had already given thought to a plan for bringing the seceding states back into the Union. He was ready to pardon the rebels, if they took oath to support the constitution and to respect the laws proclaiming the freedom of slaves. His generous plan was seconded by fighting men like Grant and Sherman. But this did not meet with the approval of Radicals in Congress like Charles Sumner in the Senate and Thad Stevens in the House. To them the S. was conquered territory to be treated with ignominy and the iron hand. Under their impulsion a Reconstruction Bill was passed which provided that the President should name a governor for each rebellious state. Further, a convention should be called to frame a new constitution for each seceding state. This document was to abolish slavery, declare the repudiation of all debts incurred for the Confederacy and disfranchise the men who led in the rebellion. Only when such a drastic constitution was adopted by the people was the President to submit to Congress the question of bringing the states back into the fold. Lincoln counteracted this by what is known as the pocket veto, that is, as Congress had adjourned and he did not sign the measure, it became null and void. But Lincoln was now dead and in his place sat Andrew Johnson (1808-75). Johnson began by making vague threats against the S. and was duly apotheosised by the Radical newspapers and politicians. But he had retained in his cabinet W. H. Seward as Secretary of State, the same post he had held under Lincoln. On the night Lincoln was mortally wounded, part of the same band of assassins attacked Seward and injured him so severely that it was thought he would succumb. Now he was back at his post and with magnanimity counselled his chief to maintain the same benevolent attitude towards the S. as had Lincoln. Johnson, a self-made man, coming from the class of the 'poor whites' of the S., veered completely around and followed Seward's advice. On May 29, 1865, he issued a pardon proclamation to the entire S. The only exceptions were the leaders, and most of these were promised pardon if they accepted certain conditions. Under him, too, the 13th Amendment to the Constitution, forbidding slavery in the U.S.A., was quickly adopted. All things seemed set fair for the S. But Johnson had not reckoned upon the wrath of Congress, which met December 4, 1865, and at once,

without any debate, passed a Bill, introduced by Stevens, for the appointment of a committee to inquire into the question of the Southern states. There was in this not only hatred of the S., but a partisan fear that, if the Southern whites were masters in their own house, the Democratic party would soon again be in control of the nation. In March they passed over Johnson's veto a Bill giving the negroes full rights as citizens, and this was afterwards embodied in the 14th Amendment to the Constitution. Furthermore, Congress declared that no Southern state could come back into the Union unless it ratified this amendment. Tennessee alone did so. In the autumn of 1868 came the election of a new House of Representatives and the opposition to Johnson prevailed decisively. Now the road was clear for the most malignant enemies of the S. Their plan was to keep troops in the S., enfranchise the ex-slaves, and keep the conquered section as a group of permanently Republican states. One of their Acts provided that citizens, white and black, taking the oath of allegiance should vote for delegates to a constitutional convention in each Southern state. The sting of this 14th Amendment was not only that it admitted the blacks as voters, but that it practically disfranchised the Southern white leaders. Three states, Virginia, Mississippi, and Texas failed to come in. The other seven did so only by reason of negro and white 'carpet-bagger' votes. To make sure that this regime would endure the 15th Amendment was adopted, denying to any state the right to disfranchise a man on account of race, colour, or previous servitude. Now ensued a tragic state of affairs. With the bulk of the whites disfranchised, the voting was by the negroes and by those whites who had come mainly from the N. seeking what they could loot. As most of their worldly possessions, when they came, were contained in carpet valises, they were known as 'carpet-baggers.' Those former Confederates, who betrayed their class and race to join in the plunder, were known as 'Scalawags.' Carpet-baggers and negroes, alike, were indiscriminately elected to office with Union soldiers at the voting booths. The legislatures were largely made up of ignorant ex-slaves. Their white leaders, who sometimes married negro women, sometimes had negro mistresses, easily procured them to pass all kinds of Appropriation Bills. The unfortunate Southern states were plunged into huge debts, most of the

money going to thieves. In the end the Southern white men formed the famous Klu Klux Klan (*q.v.*) which struck terror both into the negroes and the 'carpet-baggers' and gradually won back the power in their own commonwealths. Matters soon came to a climax with President Johnson. He found enemies within his own cabinet. Some had the grace to resign, but E. M. Stanton, Secretary for War, refused to do so. Johnson suspended him from the post and appointed General Grant. The Senate refused to confirm this, not because of hostility to Grant, but because of its bitter hatred of the President. Johnson then dismissed Stanton, and the House of Representatives, eager for the chance, adopted a resolution for the impeachment of the President. On March 5, 1868, the Senate met as the court to try him on the various charges, the chief of which was his dismissal of Stanton. The whole nation watched this great political drama, the first and only time that an attempt was made to impeach a President. Many of the witnesses were famous men. Some of the greatest lawyers in the country were engaged. There were 54 Senators and it took 36 to convict. The vote stood 35 for conviction to 19 for acquittal. Johnson was saved by a single vote.

In the Presidential campaign of 1868 the Republicans chose the war hero, U. S. Grant (1822-85), who defeated his Democratic opponent, Horatio Seymour of New York. Grant's first administration was marked by a series of measures aimed at gagging (*q.v.*) the S., and the *Alabama* affair. There was a revolt in 1872 in the Republican party over his re-nomination, and this led to the formation of a Liberal Republican party which nominated Horace Greeley (*q.v.*) for President. But Grant was renominated by the unanimous vote of the Republicans. His second term was filled with more scandals than the first, the culminating point being when his Secretary of War, W. W. Belknap, was accused of offering to sell the control of a trading post in the Indian territory. The House of Representatives impeached him, but before he was tried by the Senate he resigned from the cabinet.

In 1876 the Republicans nominated R. B. Hayes (1822-73) for the presidency, and the Democrats, Samuel J. Tilden (*q.v.*). The contest finally hinged upon the vote of Louisiana, and eventually an electoral commission was chosen which, by a partisan vote, decided that Louisiana's vote should go to Hayes, and he was duly inducted into

office. One of his first acts was to withdraw troops from the Southern states in which they were still stationed. In the summer of 1877 the long standing controversy over the Canadian fisheries question was settled by the U.S.A. paying \$5,500,000 compensation for the fish Americans had caught in Canadian waters.

In 1880 new candidates for the Presidency were nominated. For many long weary ballots the Republican convention tried to make a choice, the delegates being divided between Blaine, Grant, and John Sherman. Finally James R. Garfield (*q.v.*) (1831-81) was nominated. The Democrats also nominated a soldier, General W. S. Hancock, who had been conspicuous in some of the biggest battles of the war. Garfield was elected, but on July 2, 1881, he was shot by C. J. Guiteau and lingered in a struggle for life until September 19. Chester A. Arthur (1830-86), who had been Vice-President, was sworn in as President. The chief measure of his term was an Act signed in 1883 placing most of the gov. servants under civil service and thus removing their posts from the rank of partisan spoils. In 1884 the Republicans nominated Blaine (*q.v.*) for President. The Democrats chose Grover Cleveland (*q.v.*) (1837-1908), who had made a great reputation as governor of New York. For the first time since the days before the Civil War, a Democrat was elected, Cleveland's own state deciding the issue. He, Cleveland, pushed the cause of civil service reform. He defied powerful forces when he vetoed many pension Bills. For years this pensioning of so-called veterans of the Civil War had been a scandal. Many men, who had never been in action, had been pensioned by the Republican administrations. An Inter-state Commerce Bill was passed, the aim of which was to prevent the railways from giving big shippers cheaper rates than they allowed the smaller. In December, 1887, Cleveland sent to Congress a message denouncing protective tariffs and indicating his desire for tariffs for revenue only. The House passed a Bill in conformity with Cleveland's proposals, but the Senate rejected it. In 1888 the Republicans nominated for President, Benjamin Harrison (1833-1901), a grandson of the ninth President, W. H. Harrison. The tariff was the big issue. Harrison was elected, the pivotal state of New York this time going in his favour. The Republicans took their success as a mandate for more tariffs and they promptly passed the Mc-

Kinley Tariff Bill, which increased the duties by about 50 per cent. They also rushed through a pension Bill which added thousands to the pension rolls of the gov. and nearly doubled its expenditure for that purpose. On the credit side was an anti-trust law which at last gave the courts the power to annul contracts deemed hurtful to the interests of the general public. Then came the Sherman Silver Law, so charged with danger to the sound finances of the country. Its form was largely due to the insistence of Senators from the silver-producing states. Under this enactment 4,500,000 ounces of silver were to be purchased each month by the U.S. Treasury. Notes issued in payment therefor were payable in either silver or gold. A ratio of sixteen to one in the coinage of silver and gold was fixed and this same ratio some years later was to be the subject of several presidential campaigns. The Union was augmented by the formal admission of six new states, Montana, Washington, N. and S. Dakota, Wyoming, and Idaho. In the presidential campaign of 1892 the Republicans renominated Harrison. The Democrats nominated Cleveland on a platform which denounced the high protective tariff and the actions of the trusts. A formidable third party movement, called the People's party, nominated General J. B. Weaver on a platform calling for the free coinage of silver at 16 to 1. This was highly popular in the farming and mining states of the far and middle W. (*q.v.*). Cleveland was elected, but Weaver carried a number of states, and this made it certain that the silver question would soon be a dominant issue in American politics. The first thing Cleveland did was to withdraw from the Senate a treaty to annex the Hawaiian Is. This had been sent in by President Harrison. A revolt, largely fomented by Americans, had deposed the native queen, and the provisional gov. had clamoured for annexation. Cleveland's first opinion had been that the queen should be reinstated, but he finally recognised the is. as an independent republic. His successor in the Presidency saw the islands annexed to the U.S.A., providing the country with a powerful seat for the U.S. navy in the Pacific. In the House of Representatives large tariff reductions were made and many raw materials as well as coal and sugar were put on the free list. In the Senate the President was resisted by some of his own party. Duties were laid on sugar, coal and iron. Congress agreed finally on a compromise measure known as the Wilson-

Gorman Tariff. The McKinley Bill had raised the tariffs to about 50 per cent. The average for the new Bill was 37 per cent. The country had one of its periodical business panics prior to this event. Cleveland thought part of the trouble was the enforced purchase by the Treasury of silver bullion under the Sherman Law. He, therefore, urged that it be repealed and this was eventually done over the impassioned protests of Senators from silver mining states. The most sensational event of Cleveland's career came in the summer of 1895 when he brought the U.S.A. and Great Britain perilously near to war in the dispute between Venezuela and Great Britain over the boundaries between the former country and British Guiana. The S. American republic asked for arbitration and the U.S.A. insisted upon arbitration as the Monroe Doctrine was involved. Salisbury declined, adding that he did not accept the Monroe Doctrine as international law. Cleveland then insisted that a commission be appointed to look into the boundary matter, and declared that if such a commission found that the disputed territory should rightfully go to Venezuela, and if Great Britain did not accept such finding, it would be the duty of the U.S.A. to resist British aggressions by every means in its power. The situation became ominous, but Salisbury accepted arbitration and, in the event, most of the British claims were finally upheld.

In the presidential campaign of 1896 the free silver issue came to the fore. The Republicans nominated William McKinley (q.v.) (1843-1901), their platform upholding the gold standard, unless silver were adopted by the other major nations of the world. The Democrat leaders from the eastern states were for the gold standard, but they were easily outnumbered by the delegates from the S. and W. who nominated W. J. Bryan (*see on this* BRYAN) on an out-and-out free coinage of silver platform. In the result McKinley was easily elected, obtaining 271 electoral votes to 176 for Bryan. The new President at once called Congress into extra session to pass a tariff Bill which would produce more revenue. The result was the Dingley Bill which became law in 1897 and which advanced some of the tariffs to still higher figures.

Hardly was this out of the way, when the President centred his attention upon Cuba. For years the people of that is. had been in revolt against Spanish rule. Spain sent General Weyler there with full proconsular powers. Determined to crush the rebellion, he took strong measures.

One of these was to concentrate in the tns. the peasantry who had taken no part in the rebellion. In the tns. the more unfortunate ones died by thousands. President Cleveland had warned Spain that the U.S.A. could not look on calmly. McKinley had done the same. He then asked that American prisoners in Cuba be released and this was done. In February 1898 he sent the battleship *Maine* to Havana to guard American interests. On the night of February 15 the ship was blown up and 266 of her crew lost their lives. A naval committee of inquiry was sent to examine the *Maine* and on March 28 reported that the tragedy was caused by the explosion of a submarine mine, and the call for war was now more insistent than ever. On April 11, McKinley sent a message to Congress, saying that in the cause of humanity the war in Cuba must stop, and on April 25 war was formally declared. It was a popular war. The young men rushed to the colours. But there was an undercurrent of nervousness. Spain looked fairly formidable. The Spaniards had about 200,000 troops in Cuba and the regular army of the U.S.A. was not one quarter that size. But it transpired that the Spanish advantages were purely nominal. Their army and navy were incredibly inefficient. Out in the Far East a small fleet under command of Commodore George Dewey (q.v.) sailed to the Philippines and destroyed the Spanish fleet under Montojo with no loss of American ships or men. Later, in a combined attack by an American army, Dewey's fleet and Filipino rebels, Manila was captured with its garrison of 13,000.

In the meantime, the best ships of the American navy under Admiral Sampson had been sent to watch the Spanish fleet under Admiral Cervera, which was lying in the harbour of Santiago.

The President had called for 125,000 volunteers for the army and this number was soon forthcoming. An American army of 15,000 men was sent to the Cuban shores near Santiago. It was for the most part made up of the regulars, but there were also the famous Rough Riders enlisted under Col. Leonard Wood, an army surgeon, and Theodore Roosevelt, who had been Assistant Secretary of the Navy. The American forces took El Caney, a fortified place near Santiago, and captured the hill of San Juan, in which the Rough Riders played a conspicuous part. This minor battle made Roosevelt a war hero and opened to him his later dazzling career. Seeing that Santiago was in danger of being taken, Admiral Cervera on July 3 decided to

take his fleet out and run the gauntlet. In the absence of Admiral Sampson, Commodore Schley was in command, and at once gave battle. The entire Spanish fleet was destroyed and nearly 600 Spanish officers and men were killed or drowned. Admiral Cervera and most of his men were rescued. American casualties were one man killed and one wounded. Soon afterwards Santiago was surrendered to the Americans. Meanwhile, Porto Rico had also been invaded by an army under General Nelson A. Miles. The city of Ponce was taken without difficulty and all preparations had been made for a march on San Juan when peace came. It came because Spain had no alternative. Without an effective fleet, she could not carry on the war. She therefore sued for peace terms. McKinley demanded the surrender of Cuba, the cession to the U.S.A. of Porto Rico and of an island in the Ladronez, and occupation of the city and harbour of Manila. On August 12 preliminary peace terms were signed. The final treaty was signed in Paris, December 10, 1898. Under it, the Philippines were to be ceded to the U.S.A. for the sum of \$20,000,000. But for some years the Filipinos maintained a guerrilla warfare in the larger is. and in the end the U.S.A. had over 60,000 troops there. Eventually Aguinaldo, the rebel leader, was captured together with other chiefs and the warlike Moros in another is. were driven to the craters of their volcano lairs and vanquished. After a term of military gov., civilian rule was set up by the appointment of W. H. Taft as Governor-General. A form of gov. under American rule was also set up in Porto Rico. Cuba was not annexed. It was ruled by the American army until General Wood had restored order. A gov. of Cuba by the Cubans was finally set up and a republic established, but with important modifications to Cuban sovereignty, giving the U.S.A. coaling stations, and a veto over Cuba's relations with foreign powers.

In the Presidential election of 1900 McKinley and Bryan were again the opposing candidates. Once more the Democrats pronounced for free silver coinage, but they also denounced the imperialism of the gov. and promised the Filipinos their ultimate independence. McKinley was easily re-elected, but this kindly man, who only wished the prosperity and well-being of his fellow citizens, was not destined to enjoy his second term for long. On September 6, 1901, while attending the Pan-American Exposition at Buffalo, he was shot by an anarchist named

Czolgosz and d. on September 14. Theodore Roosevelt (1858-1919), who had been elected Vice-President, succeeded to the Presidency. It was realised that a new era had been inaugurated. Roosevelt had made enemies of the political bosses, whom McKinley knew how to placate. In the summer of 1902 the anthracite coal region was paralysed through a great strike which lasted until Roosevelt intervened and induced both sides to agree to arbitration.



(Photo by Bachrach)

CALVIN COOLIDGE

Roosevelt had actively taken up the matter of building the Panama Canal when negotiations with Colombia failed. A revolt having broken out in Panama, November 3, 1903, Roosevelt recognised the Panama Republic and concluded a bargain which made the construction of the canal possible (see PANAMA CANAL). In 1904 the Republicans nominated Roosevelt, who thus ran for the Presidency in his own right. In the Democratic party the Conservative wing won and nominated A. B. Parker, who repudiated the free silver heresy. Roosevelt was easily elected. The war between Russia and Japan had been in progress. Both sides were war-weary and both intimated that they were not averse from the intervention of Roosevelt as mediator.

He, thereupon, sent notes to both nations urging them to stop the war and offering to name a time and place for the peace conference. Peace was signed at Portsmouth, New Hampshire, in August 1905, and Roosevelt's share in the matter was rewarded by the bestowal on him of the Nobel peace prize in 1906. Largely due to his earnest support an excellent Pure Food law was passed by Congress. In the next election, the Democrats nominated Bryan for the third time, but Taft (1857-1930) was easily elected. Congress passed another high tariff Bill, the Payne-Aldrich Act which Taft signed, although at heart he had been in favour of lower duties. The President brought about postal savings banks and parcel post, and also had his Attorney-General file many suits against trusts, but his good works were lost sight of in an uproar over coal lands in Alaska. Gifford Pinchot, a friend of Roosevelt, who was chief Forester of the Department of the Interior, preferred a charge that R. A. Ballinger, Secretary of the Interior in Taft's cabinet, had favoured big business interests by allowing them to secure possession of coal lands reserved by the gov. for the ultimate use of the navy. A committee of the House of Representatives exonerated Ballinger, whereupon Taft dismissed Pinchot. This and other things caused Taft to fall into disfavour with the Roosevelt followers. When the Republicans held their nominating convention in 1912 Taft was nominated after contesting delegations favouring Roosevelt were ruled out. Thereupon Roosevelt formed his Bull Moose (*q.v.*) party and ran as their candidate. Woodrow Wilson (1856-1924), who had been president of Princeton University and governor of New Jersey, was nominated by the Democrats. Largely due to the split in the Republican ranks, he won by an overwhelming majority in the electoral college. Under his impulsion in his first term Congress passed the Underwood Act, which greatly lowered the tariffs; a finance Bill, which took the control of the nation's finances out of the hands of Wall Street and placed it under the Federal Reserve Banks; and a Bill placing American on an equality with foreign vessels in the matter of Panama Canal tolls. In 1916 Wilson was renominated and defeated Charles E. Hughes, the Republican nominee, in a close election which was decided by the state of California. Wilson's two terms were also marked by the adoption of four important amendments to the constitution—the 16th

authorised a federal income tax, the 17th enforced the election of U.S. Senators by popular vote, the 18th saddled the country with Prohibition and the 19th gave women the vote. When the Great War broke out Wilson called upon the people to be neutral both in word and deed. Many of them were neither. Those of Ger. and Irish blood largely favoured Germany. There was another large section which favoured the Allies because of England and France. Wilson was kept occupied in sending notes to England about the blockade of Germany and its interference with American commerce, and to Germany regarding its high-handed submarine outrages. (For America's part in the Great War, see WAR, THE GREAT; also ARGONNE.) When the Peace Conference opened on January 18, 1919 Wilson broke all precedents by attending as head of the American delegation. The draft Treaty did not meet with his approval. In some parts it was harsher than he deemed wise, in others there were territorial annexations, but he yielded because the Covenant of the League of Nations (*q.v.*) was interwoven with it and he believed that these articles could mitigate the rest. He returned to advocate its adoption by the U.S. Senate, met violent opposition except with reservations which he thought destroyed the Covenant's value, appealed to the people in a speech-making tour, was stricken down with grave illness, and returned to the White House a broken man. The treaty was eventually rejected by the Senate.

In 1920 a cabal of Republican Senators and bosses secured the nomination of Warren G. Harding (1865-1923) for President. Harding was at that time a U.S. Senator. The Democrats nominated James M. Cox, three times governor of Ohio. Harding was elected by the enormous majority of 404 electoral votes to 127 for Cox. His popular vote was one of the biggest in U.S.A. history. The most creditable achievement of Harding's administration was the calling of the arms conference at Washington in November 1921. Congress passed a Bill strictly limiting immigration into the country and starting the quota system (see IMMIGRATION). In September 1922 the Fordney-McCumber Tariff Bill was passed. Its new feature was that the President had power to lower or raise duties on the advice of the Tariff Commission. But the regime was darkened by some grave scandals. There was peculation and maladministration in the

Veterans' Bureau, a body charged with the welfare of the War veterans and their families, and one official, appointed by Harding himself, was tried and convicted. This was followed by the scandal concerning certain oil lands in California and Wyoming which had been created as reserves for the navy. In 1921 these lands were transferred to the Department of the Interior. A. B. Fall, the head of that department, with a seat in the cabinet, leased the reserves to two big oil corporations. Later these leases were the subject of an investigation by the Senate. It was charged that Fall had received sums of money, and he was convicted and entered the prison in his state of New Mexico to serve one year. After Harding's death Vice-President Calvin Coolidge (b. 1872) was sworn in as President. He was nominated for the Presidency in his own right in 1924 and the Democrats nominated J. W. Davis who had been ambassador to England. Coolidge was elected. He did not attempt to be a leader in the sense that Wilson and Roosevelt were. If he had any positive policy it was to interfere with business as little as possible, carefully husband and economise the nation's money, and reduce taxes and national indebtedness. These things he accomplished. The country was then enjoying abounding prosperity, the Treasury was filled with money, and several times Coolidge secured substantial cuts in the income tax rates, at the same time increasing the exemptions from the tax. During Harding's brief term the U.S.A. had made arrangements for the refunding of Great Britain's war loans from the U.S.A. Under Coolidge similar contracts were made with France and Italy. Great Britain had the worst of the transaction, being obligated to pay about 71 per cent. of what was due, reckoning principal and accrued interest, whereas France only paid 50 per cent. and Italy 25 per cent. In January 1926, at the persuasion of Coolidge the Senate voted to have the U.S.A. adhere to the World Court (see INTERNATIONAL JUSTICE, PERMANENT COURT OF), but made the action abortive, because it added reservations which the other signatory powers refused to accept. In 1927 Coolidge sent the late D. W. Morrow to Mexico as American ambassador. This gifted man quickly won the high regard of the Mexicans and brought about a settlement of all the vexatious questions which had for so long disturbed relations between the two countries. In the same year, Aristide Briand (q.v.), Fr. Foreign Min-

ister, proposed to Secretary of State Kellogg that the U.S.A. and France agree upon a treaty renouncing war between them and agreeing to settle all disputes by pacific methods. See further under KELLOGG, FRANK B.; and KELLOGG PACT. For the presidential campaign of 1928 the Republicans nominated Coolidge's Secretary of Commerce, Herbert C. Hoover. The Democrats nominated Alfred E. Smith, who had been governor of New York state more times than any man in history. The campaign was a bitter and unsavoury one, as Smith was fought



(Photo by Bachrach)

HERBERT C. HOOVER

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of adjusted compensation certificates for Great War veterans and imposing upon the Treasury a possible burden of one billion dollars. But everything that happened in Hoover's term faded into insignificance in comparison with the acute financial business and economic crisis which started with the great New York Stock Exchange slump in the autumn of 1929. Hoover at first refused to admit that there was a crisis, but with exports falling, the domestic market showing losses in business, hundreds of banks closing, and the tide of unemployment rising to an estimated 8,000,000, the President could no longer close his eyes to the facts. However, he fought every suggestion that a dole system be introduced in the U.S.A. He insisted that private contributions to charity funds in all the states and cities, coupled with Federal and state appropriations for necessary public works, could tide the country over its difficulties. In 1930 the Congressional elections went heavily in favour of the Democrats, as did the gubernatorial elections. The Senate was still held nominally by the Republicans, but the Progressive group within the party held the whip-hand. In the House the Democrats won and elected Congressman Garner of Texas as Speaker. At Hoover's request Congress in 1932 passed a Bill creating a Reconstruction Finance Corporation to deal with credit problems. It is capitalised at two billion dollars. Ambassador C. G. Dawes, accredited to Great Britain, resigned that post to become chairman of the new corporation. Also, in connection with the slump in business, came Hoover's suggestion in June 1931, which was adopted, of the nations postponing for one year all payments both of interest and principal on inter-governmental debts. (For fuller information about Presidents and others mentioned in the text, see, under separate headings, special articles dealing with them.)

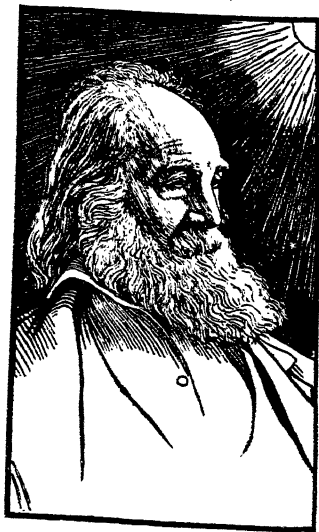
American Literature.—It is said that the first book of note written on American soil is George Sandy's translation of Ovid (pub. 1626). But this has little that is distinctive of the New World about it. There are in early American literature many sermons, pamphlets, and letters, but these claim attention rather from an historical than a literary point of view. Roger Williams's *Bloudy Tenent of Persecution* (1644) was one of the earliest pleas for religious toleration. Anne Bradstreet's poems and Wigglesworth's poem, *The Day of Doom* (1662), are also worthy of

mention. But with the eighteenth century American literature begins to strike a more distinctive note. Two great Puritan divines, a notable in the early part of the century. The first is Cotton Mather (1663-1728), whose learned and able if somewhat ill-arranged, *Magnal Christi Americana* (1702) is of great historical and theological importance. The other is Jonathan Edwards (1702-58), whose exposition of the Calvinistic conception of the universe (in the *Freedom of the Will*, 1754), and the *Treatise on Original Sin*, 1758) is the ablest setting forth of the system of theology. Benjamin Franklin's (1706-90) works are notable as the expression of a manly and vigorous personality. His *Autobiography* (pub. 1817) is plain spoken and self-revealing to a unusual extent and the earliest masterpiece of U.S. literature. His style is a model of plain yet forcible prose. He also wrote largely of contemporary politics. These were all, except Franklin, stern Puritans and mainly preachers. The literature produced in Virginia was of a lighter kind, written largely by men of action and dealing with the history and geography of their part of America. Jefferson's *Declaration of Independence* (see above), *The Federalist* (1788), written by Alexander Hamilton, John Jay and James Madison, the speeches and pamphlets of Samuel Adams, John Adams and others, come under a different category. John Woolman's *Journal* is one of the finest Quaker books, and has received high praise from Lamb and others. He was years ahead of his time. His argument against slavery induced the Quakers to part with their slaves. His was one of the first voices in favour of better labour conditions. A very naïve and refreshing book, praised by Hazlitt and Lamb, is St. John de Crevecoeur's *Letters of an American Farmer* (1782), which describes simple personal emotions and life and customs in the colonies. Philip Freneau (1752-1832), one of the best of the early poets, helped the cause of American independence by satire and song. Later John P. Kennedy (1795-1870) was really the father of all Southern plantation fiction in his *Swallow Barn*, depicting life on a Virginian estate. His romantic novel of the American revolution, *Horseshoe Robinson*, was for many years a favourite book in the U.S.A. William Gilmore Simms (1806-90) was a S. Carolinian, who had a considerable vogue with novels of the revolution. Charles B. Brown (1770-1810) was a successful writer of the so-called Gothic novel, so

current in England in his day. One of the greatest names is that of Washington Irving (1783-1859). His first great success was his *Knickerbocker's History of New York* (1809), written in a vein of wholly delightful humour. His *Sketch Book* (1819) included 'Rip Van Winkle,' perhaps the most widely read of his writings; also his delightful *Legend of Sleepy Hollow*. The same book included his piece on Westminster Abbey, which has probably sent more Americans to visit that edifice than anything else ever written. *Bracebridge Hall* followed, and then came several historical works dealing chiefly with Spain, especially his book on the Alhambra. His life of Goldsmith has charm. His later works are not up to the level of these earlier ones. His style is well-knit, and has great variety of movement. He has the highest powers of sympathetic humour, rhetorical grace, and vivid description. Gifts of quite another kind were bestowed upon Fenimore Cooper (1789-1851). He had passed a part of his boyhood among the Red Indians, and what he had seen had sunk deeply into his mind. This served as the inspiration for the novels. Among them may be named *The Last of the Mohicans* (1826), *The Pathfinder* (1840), and *The Deerslayer* (1841). Though his writing is unequal, both as between his different books and within the limits of a single book, he was possessed of the highest narrative gifts. His style possessed the highest gift of all—that of being unnoticed by the reader. He never gets between the reader and his meaning. Cooper had many imitators. William Cullen Bryant (1794-1878) was one of the earliest of America's poets. Trained to admire the school of Pope, he soon, like Wordsworth, saw that a new departure in poetry was necessary. The poetry of his mature years is distinctively American in its subject-matter, and individual in its treatment. He had fine descriptive powers, and could detect the outstanding features of a landscape and reproduce them in verse. His patriotic verse shows a sincere belief in freedom. He never fully realised the promise he gave in *Thanatopsis*, his finest and best-known poem, though the poem as it now stands includes a number of changes that were made in later years. His translation of the *Iliad* appeared in 1870, that of the *Odyssey* in 1871-72. Edgar Allan Poe (1809-49) is famous both as poet and writer of short stories. His tales include *The MS. found in a Bottle*, *The Fall of the House of Usher*, and *Tales of the*

Grotesque and Arabesque. These are the products of a prodigal imagination. They are unequalled for weird and powerful effect. His poems—the best known of which are: *The Raven*, *Ulalume*, *The Bells*, and *Annabel Lee*—are distinguished by great charm of melody, real power of lyric expression, and a perfect command of lyric form. The best known abroad of America's poets is H. W. Longfellow (1807-82). Educated at Bowdoin College, he was appointed professor first at Bowdoin and later at Harvard. He taught for many years, but this aspect of his work speedily became subordinated to his work as a poet. Among his early volumes were: *Voices of the Night*, 1839; *Evangeline*, 1847; *Golden Legend*, 1851. In 1855 *Hiacinths* appeared, and in 1858 *The Courtship of Miles Standish*. *Tales of a Wayside Inn* were pub. in 1863 and in 1867-70 a translation of Dante. The volumes named contain his best work. Longfellow's poetry has been accused, like Tennyson's, of a want of intellectual force, but his work has simplicity, and is the expression of a grave, yet gentle and kindly personality. He had a command of metre, and his metrical effects are often both striking and agreeable. His popularity is attested by the frequency with which some of his typical poems, such as *The Psalm of Life*, *The Village Blacksmith*, etc., are quoted. Hardly inferior to Longfellow's are the poems of J. G. Whittier (1807-92), the Quaker poet. In early life a journalist of the anti-slavery party, he wrote a very large number of poems on the subject of slavery and the war, though his Quaker principles forbade him to participate in the fight. His early volumes include *Lays of My Home*, 1843; *Songs of Labour*, 1850; *The Panorama*, 1856. His great success came with *Snowbound* (1866). In 1867 he issued *The Tent on the Beach*. His last volume was called *At Sundown*. *Snowbound* is his masterpiece, having descriptive vividness and felicity of phrase. A true and tender poet, he lives in the hearts of those who care for sincerity and strength, combined with a strong religious sentiment. Longfellow was succeeded as professor at Harvard by J. R. Lowell (1819-91). Lowell had early dedicated himself to poetry, and in 1841 pub. *A Year's Life*. In 1848 came *The Vision of Sir Launfal*, and in the same year appeared *The Biglow Papers*. The latter were a powerful satire on the Mexican War, and did much to shape public opinion. A second series of *Biglow Papers* appeared later in

order to satirise the Civil War. His other poetical works include a *Commemoration Ode* (1865), *Under the Willows* (1869), *The Cathedral* (1870), *Heartsease and Rue* (1888). His poetry is distinguished by a strong reforming and ethical bias and a sincere directness of expression. His early verse often contains quaint plays of poetical fancy, and he was never afraid of using comic effects in verse. Nearly all his poems reflect a true and intimate knowledge of nature. Lowell is also an essayist of great distinction. His best-known



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volumes are: *My Study Windows and Essays on the English Poets*. His prose is clear and readable, and his literary essays, though sometimes perverse in their judgments, are stimulating and suggestive. Another writer of both verse and prose is O. W. Holmes (1809-94). He was early attracted to literature, and when twenty wrote the poem *Old Ironsides*. The works of Holmes most widely read to-day are the *Breakfast Table* series of essays, *The Autocrat*, *The Professor*, and *The Poet*. He also wrote some novels, and many poems are included in the volumes of essays. His essays have a lively and unflagging humour, powers of keen satire—particularly satire on

the Calvinists—tenderness, and grace. His poems have a graceful charm, the best-known being *The Chambered Nautilus*, *The Last Leaf* and the ever-delightful *Deacon's Masterpiece*, the Wonderful 'One Hoss Shay.' The lofty and original genius of R. W. Emerson (1803-82) has been a powerful force in the history of nineteenth-century thought and literature. In early life a schoolmaster and a Unitarian minister, he left the Unitarian body owing to religious differences. His first publication of note was *Natural History* (1836), which was not well received by the public, but the value of which was clearly seen by Carlyle. For the rest of his life he lived mainly by his lecturing and later by his books. His chief works are: *Essays* (two series), *Representative Men*; *English Traits*, *The Conduct of Life*; *Society and Solitude*, and a volume of poems. His transcendental philosophy is expressed in a style at once illuminating, arresting, vivid and impassioned. His message to the ages is expressed in all his work, but is to be found practically complete in the essays on *Nature*, *Self-Reliance* and *Compensation*. For him, 'the Universe is the externisation of the soul,' and 'America is a poem in our eyes: its ample geography dazzles the imagination, and it will not wait long for metres.' Working rather by the suddenly illuminating lightning flash which reveals the falsities of the world than by logical argument, he has gained recognition as a thinker and prophet. His poetry, which falls below the level of his prose, is marked by intellectual power rather than by poetical expression. His nature poems, such as *Woodnotes*, give a faithful and charming rendering of certain aspects of country life. Emerson's friend, H. D. Thoreau (1817-62), ranks inferior only to Emerson as a transcendental writer and thinker. A fine scholar, and possessed of a note characteristic of the New World, his fame is still growing among the Anglo-Saxon races. His greatest and best-known work is *Walden, or Life in the Woods* (1854) but he also wrote other volumes of description and essays (*A Week on the Concord*; *Miscellanies*, etc.). Thoreau is one of the most individual writers in the world. His works reflect the man—they are full of whimsicality, eccentricity, felicitous description, sudden excursions into philosophical ground, and are pervaded like Emerson's with a strong ethical sense. His style is similarly varied—it can be plain or ornate, straightforward or epigrammatic, grave and studied, or light and whimsical. Though he never made

form his chief study, his form will be found invariably the most suited to his matter. John Burroughs (1837-1921) may be mentioned with Emerson and Thoreau. His three great inspirations were Emerson, Walt Whitman and Matthew Arnold, the first awakening his religious nature, the second stirring him by his humanity, the third teaching the necessity of clear expression. Burroughs' first book was *Wall Whitman as Poet and Person* (1867). He also wrote tributes to Emerson and Thoreau. Burroughs is more significant as a naturalist, and his many books dealing with nature and animal life are full of original and illuminating observation, and are further distinguished by simplicity of style. The most revolutionary figure in American literature is Walt Whitman (1819-92). It was not till 1855 that his first really great book *Leaves of Grass* appeared. His later poems include *Drum-Taps*, a record of his work as a nurse in the Civil War. He wrote in prose *Specimen Days in America* and *Democratic Vistas*. Whitman has been called 'the first democrat,' and there is something to be said for this. What seems like brag in his work is often merely a sense of his dignity as the mouthpiece of democracy. His verse is unrhymed and unmetrical in the ordinary sense of 'metre,' but it has a swinging energy and abounds in happy phrases. That his neglect of rhyme and the ordinary rhythms was not due to inability to write ordinary verse is proved by his noble poem on the death of Lincoln, *O Captain! My Captain!* Other nineteenth-century poets of America are Bayard Taylor (1825-78), who in addition to many fine lyrics made a good translation of Goethe's *Faust*; C. G. Leland (1824-1903), translator of Heine and author of *Hans Breitmann's Ballads*; T. B. Aldrich, E. C. Stedman, R. W. Gilder, R. H. Stoddard, and J. B. Tabb; J. W. Riley, the Hoosier poet; and Joaquin Miller (*Songs of the Sierras*) must also be mentioned. One of the best poets of the S. was Sidney Larier (1842-81), a close student of verse. *The Symphony* is one of his best. Paul H. Hayne and Henry Timrod were also notable Southern lyrists. If the songs of a nation are to be included in its literary heritage, then one must take account of John Howard Payne (1791-1852), author of *Home, Sweet Home*, and Julia Ward Howe (1819-1910), author of the stirring *Battle Hymn of the Republic*, which was composed at the beginning of the Civil War. Now

recognised as one of America's greatest poets is Emily Dickinson (1830-86), whose individual poetry is important for its own beauty and as a forerunner of the later poetic movement—Imagism.

Among the really great novelists one must consider Nathaniel Hawthorne (1804-64). Recognition as a novelist did not come to him soon, and his stories were written as interludes in a busy diplomatic career. His greatest works are: *The Scarlet Letter*, *The House of the Seven Gables*, and *The Marble Faun*, together with his stories for children, *A Wonder Book* and *Tanglewood Tales*, and his short stories in *Twice-Told Tales* and *Mosses from an Old Manse*. His works exhibit the finest type of romantic story-telling. He had a perfect feeling for form and for the narrative unities, and is thus in a sense classical, his works being to this extent greatly in advance of his Eng. contemporaries. But his prevailing temper is romantic, not in the sense in which Scott's is romantic, but in his power to feel the glory and beauty of the New England past, without adding a meretricious glamour by the aid of external trappings. By many Herman Melville (1809-91) is considered the greatest American novelist. His *Moby Dick* is a great prose epic of the sea, and in *Typee* and *Omoo* he took the South Seas for a subject long before they were discovered by any other writer. Though Harriet Beecher Stowe (1811-96) wrote many novels, she is best known by *Uncle Tom's Cabin* (1851-52). A well-told, realistic and dramatic narrative, it owes its large fame chiefly to its being a portrayal of certain scenes and conditions in connection with problems which then agitated the N. and S. Later great American fiction writers are Bret Harte (1839-1902), who, while painting the Far West in no flattering colours, has shown that rough externals may conceal real greatness of soul, and his fellow-humorist 'Mark Twain' (S. L. Clemens), whose laughter has in it the philosophy of a keen observer of life, and is quite free from vulgarity and offence. With the passing of time it has become clear that Twain was more than a writer of humorous books of travel and short stories of frontier life. His *Life on the Mississippi* and *Huckleberry Finn* are masterpieces. In some of his last work he became deeply pessimistic about man and life. Henry James is one of the greatest novelists of the second half of the century. He has carried the psychological analysis of human motives to its fullest development in fiction. His style is quite individual, but

is admirably suited to his purpose, and while often eloquent and ornate it is never merely grandiose. It is often obscure and involved, especially in his later work, which gave rise to Philip Guedalla's quip that there were three periods in his work—James the First, James the Second and the Old Pretender. Those who do not read his work with patience are apt to agree with another critic who said 'Right bang in front of you—nothing happens.' As a psychological novelist he was a forerunner of Proust. In his essence he was really more of a European than an American writer. A distinguished disciple of his method is Edith Wharton (b. 1862), who, if somewhat less subtle in her power of suggestion, is correspondingly more simple in style, also of the school of James is Katherine Gerould (b. 1879). William Dean Howells (1837–1920) was the founder and head of the realistic school, paying scrupulous attention to detail and deriving something of its method from the Russians. Mary E. Wilkins (Mrs. C. M. Freeman) is an important member of this group. Her stories deal with the commonplaces of New England life, and are astonishingly well written. Hamlin Garland (q.v.) with his tales of the struggles of the mid-Western farmers carried on the Howells tradition. Frank Norris (1870–1902), who lived to complete only two books of his projected trilogy of the 'epic of the wheat,' is the most significant of 'sociological' novelists. He has sometimes been compared to Zola, while David Graham Phillips (1867–1911), owing to his comprehensive outlook on American life, has been called the 'American Balzac.' With Norris is often associated Stephen Crane (1871–1900), whose *The Red Badge of Courage* (1895) definitely established the 'naturalism' of the 'nineties. Thomas Nelson Page is the author of some striking stories of Virginia life. While George Washington Cable made Louisiana his own particular field. His *Old Creole Days* is one of the outstanding books of short stories by American writers. Weir Mitchell and Mary Johnston are historical novelists of note, writing on American subjects, while Francis Marion Crawford (1854–1909), the most popular novelist of his time, concerns himself chiefly with foreign history, and Richard Harding Davis (1864–1916) with romantic war stories. The vogue of the historical novel found later contributors in Winston Churchill and Ellen Glasgow. Frank Stockton (1834–1902), author of *The Lady or the Tiger?* and other stories, was a master of the humorous

narrative and whimsical incident. A type in which Americans have been conspicuously successful from the first is the short story (see *SHORT STORY*). Irving, Hawthorne, Poe, Harte, James, Edith Wharton, a masters of international reputation in this medium. Edward Everett Hale (1822–1909) is famous for single short story, *A Man Without Country*. A new school of short story writers has developed in recent years. The founder of this school is 'O. Henry' (William Sydney Porter) (1867–1910), who, in *The Four Million* and other books, wrote of the life of the people, and employed the American idiom with much original power. Probably the author is more popular. Coincidentally, a new school of humor has risen in the writings of F. J. Dunne, creator of the sagacious *M. Dooley*, and George Ade, author of *Fables in Slang*. Earlier humorists apart from 'Mark Twain,' are Charles F. Browne ('Artemus Ward') (1834–67), Henry W. Shaw ('Josh Billings' (1818–85), Joel Chandler Harris (1848–1908), the author of the *Uncle Remus* stories, amusing dialect fantasies. The more serious short story of the 'nineties is represented in the work of Ambrose Bierce. In the summary of American literature one can hardly omit the name of Sarah Margaret Fuller ('Ossoli' (1810–50), R. H. Dana (1815–82), author of *Two Years Before the Mast* and Donald G. Mitchell (1822–1908), author of *Reveries of a Bachelor* and *Dream Life*.

The naturalistic novel, however, which had been established in the 'nineties through Russian and French influence working through such men as Howells (see HOWELLS, WILLIAM DEAN) (q.v.) and Norris (see NORRIS FRANK), survived into the twentieth century and before the Great War took the popular form of elemental virility in the novels of Jack London (q.v.) (1876–1916), whose *Call of the Wild* appeared in 1903. He is allied to Kipling, but naturalism of a type, no less bitter, but more in sympathy with humanity, is found in the works of Theodore Dreiser (q.v.) (b. 1871). He portrays life as governed by instinct and shows how all the finer virtues of civilisation are crushed beneath the struggle for existence. He is a powerful writer who probes with compassion every detail of human life. Another satirist, not of life in general but of the effect of modern business life upon the Puritan conscience, is Robert Herrick (q.v.) (b. 1868), his most important book being *Waste*. Satire of social life, but in a

lighter vein, is also a characteristic of the work of Booth Tarkington (*q.v.*) (b. 1869), while of post-War novelists the satirist *par excellence* is Sinclair Lewis (*q.v.*) (b. 1885), who has turned his satire successively on life in the small town (*Main Street*, 1920), on the business man (*Babbalanza*, 1922), on the doctor (*Arrowsmith*, 1925), and on the clergy (*Elmer Gantry*, 1927). Lewis has made respectable the art of the 'muck-raking' era at the beginning of the century which brought many writers and journalists into prominence until papers and presses were bought up or silenced by the men of 'big business' on whom the limelight had been too searchingly turned. Chief among these propagandists is Upton Sinclair (*q.v.*) (b. 1878), whose book, *The Jungle*, appeared in 1906 as a result of his investigation of the Chicago stockyards. A voluminous writer, he has two other outstanding books in *Oil!* (1927) and *Boston* (1928), the latter dealing with the trial of Vanzetti and Sacco (*q.v.*). Allied with him in what may be called 'sociological criticism' are Randolph Bourne, Van Wyck Brooks, Ludwig Lewisohn, and R. M. Lovett. Sherwood Anderson (b. 1876) is more a master of the short story than the novel, and he and Willa Cather (*q.v.*) (b. 1875) share with Dreiser, Edith Wharton, and James Branch Cabell (*q.v.*) the distinction of being the masters of American post-War fiction. Anderson dispenses with Sinclair Lewis's accurate reporting of details, but, although with less wit than the latter, he probes beneath the surface of his subject, which is mainly the life of the American peasant. He depends for his material on his own experience, as does Willa Cather, whose theme is the hardy pioneer life of the Middle West (*O Pioneers!* 1913; *One of Ours*, 1922), while *Death Comes for the Archbishop* (1927) has a Mexican setting, and *The Shadow on the Rock* (1931) is a Quebec novel. With these writers realism remains dominant; Cabell is a romanticist, but his romanticism, glamorous as it is, is undermined by his ironical humour. His distinction also is as a stylist. His best book is *Jurgen* (1919). Another romanticist, but one who escapes from life into his colourful background, is Joseph Hergesheimer (*q.v.*) (b. 1880). Escape from realism is also found in the romances of Donn Byrne (*q.v.*) and the more sophisticated type of romance, *The Bridge of San Luis Rey*, by Thornton Wilder (*q.v.*) (1927). Another novelist of greater psychological penetration is Susan

Glaspell, while in contrast is the terse style and vivid realism of Ernest Hemingway (*q.v.*). Novelists perhaps equally competent are John Don Passos (b. 1896) and Louis Bromfield (*q.v.*) (b. 1893). The vogue of fiction in the post-War decade has indeed produced many writers of varying and distinctive merit. Among them may be mentioned, Gertrude Stein (remarkable for new experiments with time in prose), Carl Van Vechten, Wilbur Daniel Steele, Irvin Cobb (*q.v.*), Ben Hecht, John Cournos, Fannie Hurst (*q.v.*), William Faulkner, Kathleen Norris, and Charles Norris (author of *Bread*).

Twentieth-Century Poetry.—The beginning of the century was marked by a poetic renaissance. The movement had been begun by Whitman, furthered by Hovey and the Canadian Carman, and ushered in by Edwin Markham (*q.v.*) (*The Man with the Hoe*, 1899) and William Vaughan Moody (*q.v.*) (b. 1869). In October 1912 the first number of *Poetry*, *A Magazine of Verse*, appeared and heralded the work of the better American poets of the twentieth century—Nicholas Vachel Lindsay (*q.v.*), James Oppenheim, Amy Lowell (*q.v.*), Robert Frost (*q.v.*), E. A. Robinson (*q.v.*), and Edgar Lee Masters (*q.v.*). The last-named with his *Spoon River Anthology* (1915) scored the most phenomenal success, but his method of brief and acid portraits was anticipated by E. A. Robinson, a poet whose chief theme is the pathos of frustration. Robinson shares his New England austerity with Robert Frost, whose work expresses the spirit of New England, with the earth of which the poet completely identifies himself. An interpreter of a different aspect of American life is Carl Sandburg (*q.v.*), whose *Chicago Poems* appeared in 1916. The characteristic of these poets is their determined use of everyday speech, while a professed 'people's poet' is Vachel Lindsay. The Imagists (*q.v.*) movement was launched by Ezra Pound (*q.v.*) (b. 1885), a cosmopolitan poet who finds much of his inspiration in Provençal and Chinese literature. The first declaration of Imagism in America was *Some Imagist Poets* (1915), edited by Amy Lowell, who, one of the most successful writers in free verse, identified herself with the movement. American poets who were Imagists were John Gould Fletcher and 'H.D.', whose exquisite workmanship has alone remained within the tenets of Imagism. Conrad Aiken, a metaphysical, attached himself for a short time to the movement, while other success-

ful exponents of free verse were Maxwell Bodenheim and Alfred Kreymborg. T. S. Eliot, whose *Waste Land* was first pub. in England in 1922 and then appeared in the American magazine, *Dial*, became the leader of poetic experimenters in England and America. Other poets allied with him in the *Dial* group are Marianne Moore, co-editor 1926, William Carlos Williams, and E. E. Cummings. The latter's poetic method is a form



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of 'telegraphese,' annotations of experience, and where his abbreviations are governed by his sincerity, he achieves beautiful effects. With T. S. Eliot the influence of Laforgue and the Fr. Symbolists (see LAFORGUE, JULES) was evident in American literature, an influence equally apparent in a younger poet of significance, Malcolm Cowley (*Blue Juniata*, 1930). Among many poets may be mentioned Witter Bynner, J. H. Wheelock, Orrick Johns, William Benét and his brother Stephen Benét (q.v.) (*John Brown's Body*, 1928), Sara Teasdale, Elinor Wylie, and Edna St. Vincent Millay. The last three named are distinguished lyric poets. With Robinson Jeffers (*Tamar*, 1924) a return to narrative is marked. The poetic renaissance in America continues, nor must the contribution of Africamerican poets be forgotten, headed by P. L. Dunbar (1872-1916) and including James Weldon Johnson and the gifted

Countee Cullen (see also under NEGROES).

Historians, Essayists, etc.—Of great American historians three may be grouped here. W. H. Prescott (1796-1859) is the first of these. In spite of the loss of one eye he worked with great courage, and early turned his attention to historical study. His first great work was *The History of Ferdinand and Isabella* (1836), a monumental work displaying enormous reading and research. In 1841 appeared the *History of the Conquest of Mexico*, and in 1847 his greatest work, *The Conquest of Peru*. In spite of the enormous erudition which went to the compilation of his volumes, Prescott is never dull. He does not stop to philosophize but tells his tale simply and well. He is one of the first and one of the most readable of modern scientific historians. The second is Francis Parkman, who also early in life decided to be an historian. His first and perhaps his greatest historical work was *The Conspiracy of Pontiac* (1851), a stirring story vividly told. In a series of volumes (*The Pioneers of France in the New World*, 1865; *The Jesuits in North America*, 1867; *The Old Régime in Canada*, 1874; *Count Frontenac and New France*, 1877; *Montcalm and Wolfe*, 1884) he treated of the history of the Fr. and Eng. in America. He had brilliant powers of description and his narrative never flags for a moment. J. L. Motley (1814-77) shared Prescott's and Parkman's gifts of vivid and picturesque description. He started as a historical novelist, but turned to history proper, and about 1845 conceived the plan of writing a history of the Dutch. The outcome of this was his world-famous *Rise of the Dutch Republic* (1856), which was followed by *The United Netherlands* (1860-68). For vigour and earnestness, pictorial imagination and rhetorical power, he is unexcelled among historians. Among other historians there is George Bancroft (1800-91), whose voluminous *History of the United States, from the Discovery of America to the Inauguration of Washington* (1834-85), though old-fashioned now in its style and thought, exercised considerable influence in the generation in which it was published, espousing as it did a strong democratic ideal. Enduring work has been done in the essay by Henry Brooks Adams (q.v.) (1838-1918), and Woodrow Wilson (q.v.) (1856-1923), and in philosophy by two writers of lasting influence and distinctive style: William James (q.v.) (1842-1910), and George

Santayana (q.v.) (b. 1863). In literary criticism the flourishing condition of creative literature has produced many controversies—the main conflict being between the 'humanistic' and the naturalistic attitudes to life. The former was maintained by the 'conservatives'—Paul Elmer More, George Woodberry, J. J. Chapman, H. S. Canby, Irving Babbitt, and Stuart Sherman. On the naturalistic side are John Macy, Van Wyck Brooks, Ernest Boyd, and H. L. Mencken (q.v.). The latter through *The American Mercury*, of which he is editor, has wielded a powerful and salutary influence over American life and letters. Another critic of importance in setting standards of taste is W. C. Brownell (q.v.), while personal and impressionistic criticism is exemplified by James G. Huneker (q.v.) and G. J. Nathan (q.v.). For drama, see under DRAMA.

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United State Naval Academy, a school for the education and training of midshipmen, at Annapolis, Maryland, U.S.A., founded in 1845. After graduation, midshipmen are commissioned as ensigns in the U.S. Navy and sometimes to fill vacancies in the Marine Corps and various staff corps of the Navy. The number of students in the academic year averages nearly 2000.

United States Shipping Board was formed under an Act of the U.S. Congress in 1916 for the purpose of creating and maintaining a U.S. merchant marine, a naval auxiliary, and a naval reserve body. The gov. was strongly convinced of the necessity of this by the experiences of England during the Great War. When the U.S.A. entered the War, the Shipping Board began ship-building on a gigantic scale. It was deemed necessary that the U.S.A. should build merchant vessels as rapidly as possible to replace those of Britain being sunk by the Ger. submarines. They were needed, not only for transport of U.S. troops and supplies, but also to carry food and supplies to the Allies. At that time the U.S.A. had sixty-one shipyards; eighteen months later 137 more had been constructed. All were operating night and day. The biggest of all was Hog Island, near Philadelphia, where 35,000 men were employed and 180 ships were under construction at one time. A large number of the ships built were of wood and, as a consequence, of not much use after the War was over. Under the control of the Shipping Board was the Merchant Fleet Corporation, which operated the ships belonging to the nation. At the close of the War it operated and owned nearly 1200 vessels plying to all parts of the world. Some of these had been built during the War. Others, like the re-named *Leviathan*, *George Washington*, *President Harding*, and *President Roosevelt*, had been seized from the Gers. when interned in U.S. harbours. However, the policy of the gov. has changed and it is gradually getting out of the shipping business and selling the vessels to private corporations, with the proviso that they shall be U.S.-owned and controlled and sail under the U.S. flag. Thus those named above, plying between the U.S.A. and Europe, were all sold several years ago to one company. The appropriations allotted to the Shipping Board and its Merchant Fleet Corporation have been over 3,600,000,000 dollars.

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Pierce, *The Tariff and the Trusts*, 1907; W. W. Jennings, *History of Economic Progress in the U.S.A.*, 1926.

United State Naval Academy, a school for the education and training of midshipmen, at Annapolis, Maryland, U.S.A., founded in 1845. After graduation, midshipmen are commissioned as ensigns in the U.S. Navy and sometimes to fill vacancies in the Marine Corps and various staff corps of the Navy. The number of students in the academic year averages nearly 2000.

United States Shipping Board was formed under an Act of the U.S. Congress in 1916 for the purpose of creating and maintaining a U.S. merchant marine, a naval auxiliary, and a naval reserve body. The gov. was strongly convinced of the necessity of this by the experiences of England during the Great War. When the U.S.A. entered the War, the Shipping Board began ship-building on a gigantic scale. It was deemed necessary that the U.S.A. should build merchant vessels as rapidly as possible to replace those of Britain being sunk by the Ger. submarines. They were needed, not only for transport of U.S. troops and supplies, but also to carry food and supplies to the Allies. At that time the U.S.A. had sixty-one shipyards; eighteen months later 137 more had been constructed. All were operating night and day. The biggest of all was Hog Island, near Philadelphia, where 35,000 men were employed and 130 ships were under construction at one time. A large number of the ships built were of wood and, as a consequence, of not much use after the War was over. Under the control of the Shipping Board was the Merchant Fleet Corporation, which operated the ships belonging to the nation. At the close of the War it operated and owned nearly 1200 vessels plying to all parts of the world. Some of these had been built during the War. Others, like the re-named *Leriatan*, *George Washington*, *President Harding*, and *President Roosevelt*, had been seized from the Gers. when interned in U.S. harbours. However, the policy of the gov. has changed and it is gradually getting out of the shipping business and selling the vessels to private corporations, with the proviso that they shall be U.S.-owned and controlled and sail under the U.S. flag. Thus those named above, plying between the U.S.A. and Europe, were all sold several years ago to one company. The appropriations allotted to the Shipping Board and its Merchant Fleet Corporation have been over 3,600,000,000 dollars.

United States Steel Corporation, the first of the billion-dollar trusts of the U.S.A., was incorporated in the state of New Jersey in 1901, being one of the gigantic operations of the banking house of J. P. Morgan. Among the concerns it controls are the Carnegie Steel Company, Illinois Steel Company, American Steel and Wire Company, National Tube Company, American Bridge Company, and the Tennessee Coal and Iron Company. The titles of the controlled companies indicate the wide extent of the corporation's activities. It owns vast iron, coal, and limestone fields, about 1000 m. of railway and over 100 ore steamers plying on the Great Lakes and the Atlantic Ocean. By its own fiat it created the city of Gary, Indiana, on the shores of Lake Michigan. What was once flat farm land is to-day a town of over 100,000 inhabitants. The corporation makes about 40 per cent. of the ingots in the U.S.A., and the par value of its capital is over one billion dollars.

United States Weather Bureau, an institution of the same type as the British Meteorological Office. The official recording of weather commenced in 1870 under the Secretary for War, but in 1890 a bureau was established under the Department of Agriculture with headquarters in Washington and stations all over the U.S.A. The duties are primarily the recording of weather with a view to 'forecasting': these are, in the U.S.A., of much greater importance inland than is the case in Britain, owing to the larger area and the occurrence of different climatic zones. Scientifically, the exploration of the upper currents of air has been a valuable work. Weather observations were begun in the early part of the nineteenth century in connection with the army medical staff. In 1847 the Smithsonian Institution, in 1869 the Cincinnati Observatory, commenced extended meteorological work. The true co-ordination of these efforts was finally brought about by the establishment of the Weather Bureau, and the publication of its reports.

United Synagogue, one of the most important groups of Jews in England. The organisation was founded in 1870 under a special Act of Parliament and was composed of over thirty synagogues, some of which were only associated and exercised no power of gov. Under the Chief Rabbi, Dr. J. H. Hertz, the U.S. came into considerable prominence and exercised much influence, not only among the Jewish people, but also among a wider pop.

United Synagogue of America is

an association of several important congregations chiefly centred in the U.S.A., but having branches in other parts of the western world. It is chiefly notable for the vigour and zeal with which it maintains strict allegiance to traditional Judaism while applying the anct. faith to new and changing conditions. One of the chief efforts of the body appears to be directed toward arousing a spirit of zeal and loyalty to the anct. teachings among young Jewish men and women, and with this end in view two active organisations, the Women's League and the Young People's League, were brought into being. Both of these devote themselves to educational work, of which the history of the Jewish people, the study of Hebrew, and the wider knowledge of traditional Judaism are the special subjects. Many members of the United Synagogue keep well abreast of current international movements and are especially interested in the developments of the Zionist movement.

Units are standards, arbitrarily chosen, in terms of which quantities may be expressed. Scientifically, Us. are of two kinds, viz. fundamental and derived. The fundamental Us. are those in terms of which all others can be expressed. The Us. of length, time, and mass are accepted as fundamental and all other Us. can be derived from these. The Eng. system of dynamical Us. is called the foot-pound-second system, since the Us. of length, mass, and time are the foot, the pound, and the second respectively. In this system the U. of area or of surface is a square foot, i.e. a square whose length and breadth is 1 ft. For measurements of volume, the U. is a cubic foot. The Us. of area and of volume are in two and three dimensions respectively. The adopted scientific system is the C.G.S. system, or the centimetre-gram-second system. This system, having the Us. suggested by its designation, is advantageous in that each U. is exactly ten times the next smaller U. of the same kind, and hence in changing Us. there is no tedious arithmetic involved. Also the Us. of length, mass, and time are conveniently related, since the mass of a certain known volume of water can quickly be obtained, 1 gram being the mass of 1 cubic centimetre of water at 4° C. Us. of force, work, velocity, etc., involve two or all of the fundamental Us. in their definition. Thus the U. of velocity is that velocity with which a point passes over U. distance in U. time (i.e. 1 cm. per sec. or 1 ft. per sec. according to the system of U., C.G.S. or F.P.S.). Two systems of electrical Us. are derived from the

C.G.S. system, viz. the electro-static and the electro-magnetic. For the definitions of the various U. see ELECTRICITY, MAGNETISM, FORCE, WATT, AMPERE, VOLT, VELOCITY, also under DIMENSION. See also Everett, *Units and Physical Constants*, 1891.

Universal, the abstract conception formed by stripping a concrete percept of all accidentals, thus creating a concept which embodies the features common to all. Thus *man* in the abstract is a universal term, while an individual man is the particular. For the great mediæval controversy as to the real existence of U., see NOMINALISM.

Universalists, primarily those who hold the opinion first definitely upheld by Origen, that all men and even the devils themselves will finally be saved. This opinion, or a modified form of it which said that all men would be saved, was common in the early centuries and is not uncommon to-day. The name U. is also given to a sect founded in 1774 in America by John Murray. A later important member of the sect was Hosea Ballou, whose advanced Unitarian beliefs have now been widely accepted among all Universalist churches. See Farrar, *Eternal Hope*, and Eddy, *Universalism in America*, 1884-86.

Universal Language, see ESPE-RANTO; VOLAPUK.

Universal Time, a system of reckoning time to be uniformly used throughout the civilised world for international purposes. Its use was agreed upon at the International Conference at Washington in 1883. By it the day is considered as one of twenty-four hours. The circumference of the earth is divided into twenty-four parts of 15° each, and a local time is fixed for each, in which all odd minutes and seconds are ignored. Thus the local times differ from the U. T. only by even hours.

Universities are corporations, either lay or clerical, which have had the charge of educating the members of the learned professions throughout Europe and the colonies founded by European states. In its earliest uses the term *universities* was not confined to scientific bodies, but was used in a general sense equivalent to our modern word corporation. This was the Rom. sense of the word, and it was long before it gained its present significance. The University of Pavia, Italy, was founded by Lothaire, grandson of Charlemagne, in 825. Oxford University was traditionally founded by Alfred in 872. But university life more nearly as it is understood to-day begins with the foundation of the University of Paris, which became consolidated towards

the end of the twelfth century. To almost every cathedral and monastery of Europe there has, from a very early period, been attached a school in which were instructed all candidates for the priesthood and such laymen as could afford it. It appears from the letters of Abelard (d. 1142) and from other contemporary sources, that in Paris the poorer establishments entrusted the conduct of this school to one of their number called the Scholasticus, and that the wealthier bodies maintained a Scholasticus to instruct the junior pupils in grammar and philosophy, and a Theologus to instruct the more advanced in theology. About the time of Abelard large numbers of young men began to move in the direction of Paris, and the reputation of Abelard himself did much to make the name of Paris everywhere famous. A more elaborate organisation became necessary, but the Parisian organisation is marked by being primarily in the hands of the teachers and doctors. At the head stood the rector, elected by the four faculties of theology, arts, law, and medicine. The members of the U. were divided into four nations, France, Picardy, Normandy and England, including students from Germany, Ireland and Scotland. At an early period colleges were established within the U. of Paris by private families or religious orders. Originally they were intended exclusively for poor scholars, who were to live in them subject to a certain discipline. By degrees, as more numerous and able teachers were employed in these colleges, they assumed the character of boarding houses for all classes of students. The growth and organisation of the U. of Paris has here been dealt with in some detail as being the most famous example of that class of U. in which the gov. rested almost entirely with the teachers. Opposed to Paris in this respect was Bologna (founded 1200). Here all jurisdiction rested with the students, who elected their own governors. During the Middle Ages Paris was a great theological school. Bologna was pre-eminent in the study of canon law, and a third U., Salerno, was famous for its medical school. The growth of U. throughout Europe was rapid. Before the Reformation they were established in Italy, France, the Ger. empire, Spain, Great Britain, and even among the Slavonic nations E. of the Gers. In all of these we recognise the leading features of Paris or Bologna. With the revival of learning, which came at the time of the Reformation, the old U. under-

went some change and many new ones were founded. They almost entirely lost their clerical character, other sciences were added, and the power of the U. was gradually restricted. The spread of learning prevented its monopoly by close corporations, and the invention of printing co-operating with the extension of elementary and secondary schools did much to raise the standard of education among those classes which did not receive a U. education. In no way less considerable is the change which has passed over the U. of Europe during the past century. The general expansion of men's minds, due to the marvellous inventions of the time and the spread of civilisation, has made this necessary, while the most important single factor is the rapid advance made in the study of natural science.

There is some danger that the older academic purpose of university education may be lost in the democratic tendency to turn the university into a place for training men and women for any and every walk of life. University extension courses were devised largely to find a mean between these two extremes, for while the application of the knowledge conserved by the U. must be experimental, not dogmatic, the need for dogmatic instruction in the application of higher knowledge does exist. Cambridge University was the first to meet this outside need by local lectures, started in 1873. A Ger. writer, W. Dibelius, *England* (Eng. trans. 1930), notes 'there is hardly a town where it (university extension) has not played its part in educational developments. In many the movement has grown into a college (Nottingham, Exeter), in others (Sheffield, Reading) it has developed into a university.' Eng. extra-mural courses have been restricted to academic subjects, with the result that there is 'less difference of outlook between extra-mural and intra-mural classes than there was in earlier days' (*Adult Education in Lancashire and Cheshire*, H.M.S.O., 1929). Eng. U., although some vocational courses (e.g. journalism) are included in their curriculum, have therefore avoided the difficulties of many American U. (Columbia and Chicago among them), which admit as degree subjects 'practical poultry-raising,' 'advertising,' 'feature writing,' 'book reviewing,' 'wrestling, judo, and self-defence.' This *ad hoc* training is not common to all; among those which reject it are Harvard, Yale, Princeton, Swarthmore, Vanderbilt, Amherst, Williams, Barnard, Bryn Mawr, Smith, and Wellesley.

Moreover, although the idea of university as a place of research may be lost sight of in the lower grades of university work, it is furthered by the growth of post-graduate work which owes much to travelling scholarships and to the hospitality extended to overseas students, generally and in a specified form, such as the Rhodes Scholarships. Post-graduate work especially in the U.S.A., is a praiseworthy feature of modern U. The graduate school at Yale was established in 1847 and of Harvard in 1872, but their distinctive developments were later, following the creation of a graduate school at Baltimore in 1876, on the Ger. model, and the opening of the Johns Hopkins University in the same year. These U., as well as Princeton, Columbia, Michigan, Pennsylvania, and especially Chicago have, among others, been distinguished for the vitality of their post-graduate work, placing at the disposal of scholars excellent equipment both scholastic and scientific, establishing schools at Rome, Athens, Baghdad, Jerusalem, Luxor, etc., and despatching archaeological expeditions to historic sites. The practice of 'wandering' from one university to another has long been the custom of Ger. students, who maintain the century-old tradition of Ger. intellectual unity, instilled into Ger. university life by such men as Hegel, Fichte, Schleiermacher, and Humboldt, and dating from the creation of Berlin University (1810). Ger. university education was aristocratic in tone, but, although since the Revolution equality of opportunity has been introduced, the standards have not been lowered. The problem everywhere is that universal education may lower the standard of secondary education, and it is on that that the U. ultimately depend. University education is now extended to women equally with men in European and American countries and, since 1920, in Japan, women being either admitted to the older U. or forming U. of their own. Women were admitted to degrees in London University in 1878. Girton College (q.v.) was founded at Hitchin in 1869. Women were admitted to the Tripos in Cambridge in 1872, to degrees in 1923, to university teaching posts in 1926. In Oxford women were admitted to examinations in 1884, to degrees and full membership in 1920, and to university teaching posts in 1927. Women were admitted to U. of Scotland in 1892, Durham 1896, Dublin 1904. All later Eng. U. are co-educational. Co-education is almost universal in American and Canadian U., Amherst, Brown, and

Notre Dame in the U.S.A. and St. Dunstan's, Charlottetown, and St. Francis Xavier, Antigonish, in Canada are, however, for men only, while Yale, Harvard, Johns Hopkins, and N. Carolina are co-educational only in part. Bryn Mawr, Grenada, and some other U. in the U.S.A. are for women only. See W. Lexis, *Die Universitäten im Deutschen Reich*, 1904; F. Paulsen, *The German Universities* (Eng. trans. New York, 1906); R. B. Haldane, *Universities and the National Life*, 1910; E. E. Slosson, *Great American Universities*, 1910; H. A. L. Fisher, *The Place of the University in National Life*, 1919; E. Deller, *Universities in the United States*, 1927; H. G. G. Herklots, *The New Universities*, 1928; R. G. Angell, *A Study in Undergraduate Adjustment*, 1930; A. Flexner, *Universities*, 1930. See also separate articles on certain universities.

University College, see LONDON.

University College, Oxford, dates from the year 1249, when William, Archdeacon of Durham, bequeathed a sum of money to maintain certain graduates of the university, the institution obtaining the name 'The Great Hall of the University,' which is still part of its designation. Later on, however, legend named King Alfred as the founder and assigned 872 as the date.

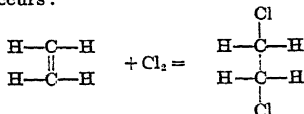
University Settlements, those houses now to be found in the poorer parts of many large cities in the British Isles and America, where men and women who have had the advantages of a university education may live and share these advantages with their less fortunate fellows, and by their influence improve the social and intellectual condition of the whole dist. The scheme began among certain Oxford men who in the early 'sixties spent their vacations in Whitechapel and Stepney. The first regular settlement, Toynbee Hall (*q.v.*), was founded in this dist. in 1884, and was soon followed by others run on similar lines, such as Cambridge House in Camberwell, Oxford House in Bethnal Green, Talbot House (women's settlement), also in Camberwell, and so forth. Since their foundation the movement has spread very largely, and there are now no less than fifty such settlements in Great Britain as well as a smaller number of educational settlements. There are also large numbers of missions supported by public schools and university colleges. Their influence for good has been, and still is, great, in effecting social legislation, in forming powerful voluntary associations for social welfare, in improving the standard of working-class recreations,

in providing free legal advice, and training in model parliaments, as well as clubs and libraries for boys, girls, and adults. The movement spread to America, where there are now several hundred such settlements; and, as they enjoy larger incomes than ours, their operations are on a larger scale.

Unreason, Abbot of, see ABBOT OF UNREASON, and FOOLS, FEAST OF.

Unruh, Fritz Wilhelm Ernst von, Ger. author and playwright; b. May 10, 1885, at Koblenz; son of Lieut.-General Karl von U. U. became lieutenant, 2nd Grenadier Guards, 1905, at Berlin. Spare time given to university. Practised painting and sculpture. Plays: *Offiziere*, 1912; *Louis Ferdinand, Prinz von Preussen*, 1914; *Stürme*, 1914; *Vor der Entscheidung* (dramatic poem), 1915; *Ein Geschlecht*, 1916; *Platz*, 1920; *Rosengarten*, 1921; *Heinrich ans Andernach*, 1925; *Bonaparte*, 1927; *Phaea*, 1930. His *Opfergang* (anti-militarist war-sketches), 1916, occasioned his confinement in an asylum. Member Prussian Academy, 1925.

Unsaturated Compounds, in chemistry, are compounds that will form derivative substances by direct addition. Thus ethylene, C_2H_4 , combines directly with chlorine to form ethylene dichloride: $C_2H_4 + Cl_2 = C_2H_4Cl_2$; and acetylene, C_2H_2 , will combine directly with bromine to form acetylene tetrabromide, $C_2H_2Br_4$: $C_2H_2 + 2Br_2 = C_2H_2Br_4$. Ethylene and acetylene are therefore said to be unsaturated, as contrasted, for instance, with methane, CH_4 , which can form derivatives only by substitution. Thus, when methane reacts with chlorine, a hydrogen atom is removed for every chlorine atom that enters: $CH_4 + Cl_2 = CH_3Cl + HCl$; $CH_3Cl + Cl_2 = CH_2Cl_2 + HCl$; and so on. Unsaturation can usually be explained by assuming unsatisfied valency bonds in the compound. Thus, in ethylene, $H_2C=CH_2$, the two carbon atoms are held together by a double bond, while a single one would be sufficient and would indeed be stronger, since the partial satisfaction of the bonds is easily disrupted when an opportunity for full satisfaction occurs:



Unsaturated.

Saturated.

Unsoundness, see WARRANTY.

Untermeyer, Samuel, American lawyer; b. March 2, 1858, at Lynch-

burg, Va.; son of Isadore U. Educated: College of the City of New York; law school of Columbia University—graduated there, 1878. Admitted to New York Bar, 1879. Member of Guggenheimer, Untermyer, and Marshall. Attorney for committee of Congress in 'Pujo Money Trust' Investigation, 1912; counsel before committee of Senate as to 'campaign' contributions by Senator La Follette, 1924. Has frequently fought trusts: helped Democratic Congress in framing Anti-Trust Act, 1913-14; defeated grant of N.Y. water-power rights to private interests. Counsel for Bernstein against Henry Ford, when latter was induced to withdraw publications attacking Jewish community, 1927.

Unterwalden, a forest canton of Switzerland, lying to the S. of the Lake of Lucerne. It is divided into Obwalden (area 189 sq. m.) and Nidwalden (area 106 sq. m.). Pasturage and dairy work are the chief industries. It was one of the founders of the Confederacy. Sarnen and Stanz are the caps. Total pop. (1930) 34,486.

Unyamwezi ('country of the Moon'), a dist. in Tanganyika Territory, situated S. of Lake Victoria Nyanza and E. of Lake Tanganyika. It comprises the dists. of Tabora, Kahama, Nzega, and Shinyanga. It consists of plateaus, sloping northward, which form the watershed between the Nile and Congo. It is very fertile, densely wooded, but swampy in the W., and is very populous. The Bantus of U., the Wanyamwezi or, in Swahili, 'Nyamwezi', are occupied in agriculture and trading. Centuries ago they had a trade in ivory with the Zanzibar coast. Speke and Burton were the first white men known to have set foot on the soil. Tabora (25,000), the cap., is situated at the junction of the main caravan routes from the coast to Lake Tanganyika and from Victoria Nyanza to Lake Nyasa, but its position as the most important inland tn. of Tanganyika Territory is being rapidly challenged by Dodoma; and, with the extension of the railway to Mwanza, Tabora has practically ceased to be a distributing and collecting market. Pop. 565,000.

Unyoro or Bunyoro, formerly a kingdom of British E. Africa, situated just N. of the equator, between Uganda and Lake Albert Nyanza. The dominant native tribe, the Wan-yoro, are kinsmen of the Ganda tribe, but less progressive. For long independent of European control, it is now merged with the British Protectorate of Uganda. Its area is about 5600 sq. m. and the native pop. about 100,000.

It is ruled by a native 'king,' whose rights are regulated by treaty, but for Europeans or other non-natives justice is administered by British courts.

Upanishad, *see* VEDANTA.

Upas-tree, *see* ANTIARIS.

Uphall, a par. and vill. of West Lothian, Scotland, on Brox Burn. There are paraffin works and shale is mined. Pop. (1931) 11,119.

Upolu, *see* SAMOA.

Uppingham, a market tn. in Rutlandshire, England, with a fine church, and a public school of importance, which dates from the sixteenth century, and is capable of receiving 500 scholars. Pop. (1921) 2453; with rural district (1931) 5292.

Uppsala, or Uppsala, the cap. of the län of Upsala, Sweden, on both sides of the R. Fyris. The old tn. is on the W. bank and the new on the E., the two being joined by five bridges. It is a tn. of great historical interest. Its university, with which Linnæus was connected, was founded in 1477 and the new buildings were erected in 1879-86. In the Gothic cathedral (1230-1435) are buried Gustavus Adolphus and Linnæus. U. is the metropolitan see of the Swedish State Church. Pop. (1929) 30,208.

Ur, called in the Bible 'U' of the Chaldees; an anct. city of S. Babylonia, at the meeting of the Euphrates, the canal Shat-el-Hai, and the Wady Rummein; identified with modern Mugheir. Remarkable results have been achieved at U. by the joint expedition of the British Museum and the Museum of the University of Pennsylvania in tracing the walls of the anct. city, the circuit of which is about two and a half miles. The most surprising discovery is that the U. of the third millennium B.C. was a city of waters. A broad canal, coming apparently from the N.E., washed its eastern walls and divided the tn. proper from an extensive suburb which lined the eastern bank, where the mounds of ruins are strung out in a line a mile and a half long. Excavation of the wide stretch of low-lying ground at the N. corner has shown that this part was a harbour enclosed by long moles on which were walls linked up with those of the city. This harbour lay just in front of the great temple of the Moon God, with which it probably was connected. From it there seems to have been a small canal which cut right through the old tn. and divided that part which contained the Temenos and the palaces from the more crowded residential quarter. On the W. was a smaller rectangular harbour lying inside the tn. walls and communicating with the Euphrates.

As a precaution against floods the level of the tn. had been raised well above that of the surrounding country, and the walls of defence were at the same time retaining-walls for this terrace. The lower part of the wall was a huge rampart built of mud bricks. It was about 26 ft. high and its width varied from 70 ft. to over 90 ft. It was built in the time of the Third Dynasty, probably by King Ur-Engur (2300 B.C.), and its colossal size must increase our admiration for the builder of the Ziggurat. At intervals on the rampart there were projecting towers whose footings are cut down low into the slope of the mud-brick wall, and sometimes this is itself revetted with burnt brick and buttressed, possibly for quays or defensive works. Massive though it was, the rampart, both by the nature of its material and by its exposed position with the water at its foot, was peculiarly liable to destruction. Generally its whole face has been weathered back to a gentle slope and the buildings which crowned it have vanished. By 1930, the expedition had completed the excavation of a most interesting temple. This temple was dedicated to Enki, the god of the waters under the earth. The clay foundation-cones, the dedication tablet, and the copper figure of the king enclosed in a box in the brick-work announced that it was built to a larger plan than before by Rim-Sin of Larsa in the year 1990 B.C. Beneath it were found the hacked remains of its predecessor with bricks stamped with the name of Bur-Sin, king of the Third Dynasty of U. (c. 2220 B.C.). Among other temples discovered was one inside the tn. at the back of the northern harbour and facing the Ziggurat. This temple was restored by Nabonidus, the father of Belshazzar, in about 550 B.C. (see *The Times*, April 1930). It may be noted that the tombs of the Third Dynasty recovered by the expedition, under the leadership of the famous archaeologist, C. Leonard Woolley (q.v.), are the largest which have yet been found in Mesopotamia, and that their date is about 2400-2300 B.C. Ur-Nammu, the first king of this dynasty, built the Ziggurat, the great temple which, like the Tower of Babel, sought to reach upwards to the heavens. The importance of the discovery of these tombs is enhanced by the fact that no literary texts of the dynasty survive. It may also be observed that Woolley's excavations have revealed some seven strata corresponding to as many superimposed and successive periods of culture. Below them all lies the primi-

tive marsh so that, in this context, archaeological research has reached its farthest possible.

Uræmia, a toxic condition caused by insufficient excretion of urea. It may be brought about by kidney disease, or may be central nervous in origin, metabolism being disturbed through lack of the necessary stimuli to excretion. The presence of urea in the system brings about toxic effects; the nerve centres are poisoned and there is often a comatose or uncoordinated condition which often resembles drunkenness. Three varieties are recognised: acute, latent, and chronic. In acute cases bleeding by the application of leeches is productive of good effects. In chronic cases a regular course of Turkish baths is said to have the effect of stimulating excretion and so diminishing the excess of urea.

Ural, or Yaik, a riv. of Russia rising in the U. Mts. in the gov. of Orenburg. It flows S. to Orsk; then N. to Orenburg and Uralsk, and again S. to the Caspian Sea, which it enters by many branches, forming a large delta. For many miles it is the boundary between Europe and Asia. Length 1335 m. It has large fisheries.

Uralite: (1) A pyroxene (augite) which has been altered to an amphibole (hornblende). The crystals have the form of augite, but the cleavage of hornblende. It is found in the Urals, Norway, the Tyrol, and in India. (2) The name given to a fire-proof building material composed of chalk, silicate, and bicarbonate of soda and asbestos fibre.

Ural Mountains (the Hyperborean Mountains, or Rhipæi Montes of the ancients) form part of the boundary between Europe and Asia, and separate European Russia on the W. from Siberia on the E. The chain extends S. from the Kara Sea, an arm of the Arctic Ocean, to the middle course of the Ural R., a distance of about 1333 m. Its breadth varies from 16 to 66 m. The mineral riches of the chain are chiefly contained in the Middle Ural, commonly called *Rodnoi* (metalliferous), and this section also contains the highest peaks, such as the Kanjakovski Kaven (5000 ft.). The chief minerals produced are gold, copper, platinum, and iron.

Uralsk: (1) An administrative area of Russia, situated on both sides of the Ural Mts. It is 653,400 sq. m. in area, and stretches from the Arctic in the N. to Kazakstan (q.v.) in the S., the Tatar and Bashkir republics bound it on the W., and Siberia on the E. It is not, however, coterminous with the pre-revolution gov. of U., which is now merged in Kazakstan. Extremely diverse in

climate, physical features and natural advantages, its great expanse shows thriving metal works, with electric power plants in the mineral-producing region, and barren wastes in the bleak tundras of the N. The climate is very cold in winter, especially in the tundras, but hot in summer. The country is watered by the Kama and tributaries, which connect with the Volga, and by canals which afford communication with Leningrad. The chief minerals are iron—chiefly magnetite—found in the vicinity of Zlatovst; coal, mined around Chelyabinsk and other places in the Urals; copper; phosphates; and salt. Mining is the principal occupation, but agriculture and stock-raising are also considerable peasant activities. There are large sheep-grazing areas, and reindeer are also bred. The chief industries are smelting, manufacture of machinery and metal goods generally, and fishing. The administrative centre is Sverdlovsk (pop. 136,490 in 1926); other towns are Perm, Chelyabinsk (q.v.), Zlatovst, Fiumen, Tobolsk, Troitsk and Irbit. Pop. nearly 7,000,000, mostly Russians, the remainder being Tatars, Poles, Finns and other Baltic races. (2) A Cossack tn. on the Ural River, 280 m. from the Caspian Sea. It is a considerable trading centre.

Uranium, a metallic chemical element, symbol U, atomic weight 238.1, atomic number 92, which occurs as oxide, UO_2 , $2UO_3$, in pitchblende, and is found as such in Cornwall, Colorado, the Belgian Congo, and Joachimsthal. The metal is prepared by several methods, but may be obtained by the reduction of the chloride with sodium. It is a hard white metal (sp. gr. 18.7), which melts in the electric furnace. U. forms the oxides UO_2 , UO_3 , and UO_4 , and also oxides U_2O_5 and U_3O_8 , which may be regarded as combinations of two oxides. U. dioxide (UO_2) and trioxide (UO_3) are both basic oxides, the former yielding the unstable uranous salts (e.g. uranous sulphate $U(SO_4)_2$) and the latter the uranyl salts (e.g. the nitrate $UO_2(NO_3)_2$). U. peroxide UO_4 gives rise to the peruranates. U. is radioactive, spontaneously disintegrating into radium, etc., and finally into lead. The period of transformation of U. into lead is extremely great, as may be judged from the fact that, in U. minerals, there is only 1 gm. of radium to every 3 tons or so of U. See RADIOACTIVITY.

Uranus, in anct. Gk. mythology, the husband of Gæa (Earth) and the father of Cronos (Saturn) and other Titans, Cyclops, and Hecatoncheires. He represents heaven and the gener-

ative power of the sky with its sun and rain. He was dethroned and mutilated by Cronos, and from his blood were formed the Gigantes on earth and Aphrodite in the sea. The Romans translated the name as Cælus.

Uranus, the first planet to be discovered since the invention of the telescope, was found by Sir William Herschel on March 13, 1781, and named by him *Georgium Sidus* in honour of King George III. It is the outermost but one (Neptune) of the planets, its distance from the sun being about twenty times that of the earth. It is four times the earth's diameter, and its mass one-twentieth that of Jupiter. In density it is about the same as the latter planet, i.e. slightly denser than water. Four satellites at least (the number is uncertain) attend U., the plane of their orbits being almost perpendicular to the ecliptic.

Urardhas, see ARARAT.

Urari, see CURARE.

Urban, the name of eight popes.

Urban I. was pope 222–30.

Urban II. (pope 1088–99), a Frenchman by birth, and originally a monk of Cluny. Soon after his election, he resumed possession of Rome, the fortresses of which had been occupied by the anti-pope, whom he compelled to withdraw, and was thus brought into further conflict with Henry IV. of Germany. A great council was held at Piacenza in 1095, in which the anti-pope and his adherents were excommunicated. In his later pontificate U. succeeded in driving Henry IV. out of Italy. He held a council at Bari in 1098, in which many Gk. bishops were present, and in which the addition of the words *filioque* to the Creed was discussed. Thence he returned to Rome, of which he obtained full and undisturbed possession; and he *d.* at the close of 1099, just at the time when the First Crusade which he had organised terminated in the successful occupation of Jerusalem.

Urban III. (pope 1185–87) became Archbishop of Milan 1182, cardinal 1185, and succeeded Lucius III.

Urban IV. (pope 1261–64) instituted the feast of Corpus Christi, 1264.

Urban V. (pope 1362–70) is remarkable as the last of the popes who resided at Avignon, and the one by whom the papal seat was for a time re-transferred to Rome. He was a native of France, and had been Abbot of St. Victor at Marseilles. After various alternations of peace and contest, U. went to Rome in Oct. 1367. He found the papal city in a condition all but ruinous, and the whole of Italy overrun by bands of

mercenaries. He endeavoured to repress these disorders, but with little success; and in 1370 he returned to Avignon, where he died.

Urban VI. (pope 1378-89), under whom the great Western Schism had its origin, when Clement VIII. was elected anti-pope in 1378. U.'s name was Bartolomeo Prignano, and at the time of his election he was Archbishop of Bari. Clement took up his residence at Avignon. U., on the contrary, remained at Rome, where he appointed twenty-six new cardinals, and excommunicated Clement and his adherents. U. was recognised as the lawful pope by one portion of the West, Clement by the other, and each maintained his claim by measures of the most extreme character. U. having engaged in a dispute with Charles, king of Naples, whom he had himself crowned, he was besieged by that prince at Novara, whence he withdrew to Genoa, taking with him, as prisoners, the cardinals of his party, with whom he had quarrelled, and several of whom he is said to have put to death. In 1389, while he was on his way to Ferentino, he fell from his horse, and died from the injuries thus sustained.

Urban VII. (pope Sept. 15-27, 1590).

Urban VIII. (pope 1623-44) was the successor of Gregory XV. His family name was Maffeo Barberini. In the difficult position of Rom. affairs, as complicated between France, Austria, and Spain, in the war of the Valtellina, to which he succeeded on his first election, he acquitted himself with much dexterity. His pontificate was also signalised by the acquisition to the Holy See of the duchy of Urbino in 1626. He was the founder of the celebrated College of the Propaganda, and to him Rome is indebted for many public works, including large and important additions to the Vatican Library. Some of the early stages of the Jansenist controversy fall within this pontificate. See F. Hayward, *History of the Popes* (Eng. trans. 1931).

Urbana: (1) The co. seat of Champaign co., Ohio, U.S.A., 42 m. N.W. of Columbus; the seat of a Swedenborgian university. Pop. (1930) 7742. (2) The co. seat of Champaign co., Illinois, U.S.A.; 61 m. N.W. of Terre Haute, the site of the Illinois University and state laboratory. Pop. (1930) 13,060.

Urban District Council, see LOCAL GOVERNMENT.

Urbino (Lat. *Urbium Hortense*), a tn. in the prov. of Pesaro e U., the Marches, Italy, between the Foglia and Metauro, 23 m. S. by E. of Rimini. It has a fine ducal palace of

the Montefeltro family (1468), a cathedral, free university (1564), and the house in which Raphael was b. (1483). The manufactures include silk, majolica, bricks, and olive oil. Pop. 20,000.

Urdu, see HINDOSTANI LANGUAGE AND LITERATURE.

Ure, a riv. of N. and W. Ridings, Yorkshire, England, which rises 7 m. S.W. of Muker, near the borders of Westmorland. It is about 70 m. long and joins the Swale, forming the Ouse.

Urea, or Carbamide, $\text{CH}_4\text{N}_2\text{O}$, a compound which occurs in the urine of mammals and of carnivorous birds and reptiles. It forms about 3 per cent. of the human urine. It may be prepared from urine by evaporation to small bulk and adding strong nitric acid. The precipitated crude U. nitrate is recrystallised from nitric acid and dissolved in water. The solution is then decomposed with barium carbonate, evaporated to dryness, and the urea extracted with alcohol. In the laboratory, U. is more commonly prepared by heating ammonium cyanate. It forms colourless crystals (melting point 132°C.) soluble in water and alcohol, and combines with acids to form salts. It is decomposed on heating, and heated with sodium hypobromite gives off nitrogen. This latter property is used as a method of estimation. U. was discovered in urine in 1773, and was artificially produced by Wöhler in 1828, the discovery being of fundamental importance as the first synthetical production of an animal product. The exact structure of the U. molecule is still a matter of controversy. U. is nowadays manufactured on a fairly large scale from calcium cyanamide, for use as an artificial manure; it is also used in the manufacture of a clear synthetic resin, and in the preparation of various drugs, e.g. veronal (q.v.). See E. A. Werner, *The Chemistry of Urea*, 1923.

Urfa, or Urfah, see EDESSA.

Urfé, Honoré D' (1587-1625), a Fr. writer, b. at Marseilles. His life, like his writings, was extremely romantic. After serving for some time in the wars of Henry IV. he married Diane de Château Morand, but the union was an unhappy one. His chief production was the pastoral romance *L'Astrée* (1610-18), which enjoyed unparalleled popularity for nearly half a century.

Urga, called, since 1924, Ulan Bator Hoto, is the cap. of the republic of Outer Mongolia, on the R. Tola, 170 m. S. of Kiachta. The city is important as containing the residence of the Hutukta Lama, the head of the Mongolian Buddhists. It is an important commercial centre

and the terminus of a motor service to Kalgan, across the Gobi Desert. Pop. 100,000.

Uri, one of the forest cantons of Switzerland. It is bounded by the Lake of Lucerne and the cantons of Schwyz, Glarus, Grisons, Ticino, Valais, Bern, and Untervalden. The principal river is the Reuss, whilst the St. Gothard Railway crosses the canton. Cattle-rearing is carried on, also cheese-making and bee-keeping, but more than half the surface is barren rock or glaciers. The chief tn. is Aldorf. The canton was the scene of fighting between the Fr. and the Russians and Austrians in 1799. Area 415 sq. m. Pop. 18,500 (principally Rom. Catholics).

Urial, Corial, or *Oris rignei*, known also as the Punjab wild sheep, a species of the genus *Oris*, found chiefly in the Punjab, Afghanistan, and Persia. It has large, twisted horns, firmly set in the skull. The curve in the male is large.

Uric Acid ($C_5H_4N_2O_6$), a product of the metabolism of the animal organism, and occurs in small quantities in human urine. It sometimes accumulates in the bladder, forming 'stones,' or is deposited in the tissues of the body (gout and rheumatism). The excrements of birds (guano) and of reptiles contain large quantities of the acid. Serpents' excrements consist chiefly of ammonium urate, and the U. A. is prepared by boiling with caustic soda and the clear alkaline solution precipitated with hydrochloric acid. The acid forms crystals which are insoluble in water. Evaporated with nitric acid, a yellow stain is left, which becomes intensely violet on addition of ammonia. U. A. is a weak dibasic acid, and forms salts which are all sparingly soluble in water. The lithium salt is fairly soluble, and hence lithium compounds are used in medicine for gout and rheumatism, etc., though with doubtful efficacy.

Uriconium, see WROXETER.

Urim and Thummim, two objects mentioned in the Priestly narrative as oracles through which the will of Yahweh was discovered on certain occasions. The earliest reference made to them is in 1 Sam. xiv. 41 ff., but no description of them is given in any place nor is anything more now known. They seem in some way to have been connected with the ephod or breastplate and served the purpose of lots. The R.V. translates by 'Lights' and 'Perfections' (Exod. xxviii. 30). The words themselves are enigmatical, and are apparently Egyptian or Assyrian, modified to make them significant in Hebrew.

Urinary Calculus, see CALCULUS.

Urine, the fluid excreted by the

kidneys. It contains a large proportion of water together with some of the waste products of metabolism. The kidneys extract these waste products from the blood and pour their secretions into the ureter, by which the fluid reaches the bladder, there to be retained for a while until it is discharged to the exterior by the urethra. It is not known how the U. is formed in the kidneys, though it is probable that the different constituents are secreted in different parts of the kidney tubule. The water and some salts are separated out at the glomerulus at the commencement of each tubule, and the other constituents are added in the convolutions before the U. reaches the pelvis of the kidney. U. as excreted is normally a clear amber liquid of sp. gr. about 1.02 and an acid reaction. It is a very complex liquid. The bulk of it is water, in which are dissolved mineral salts and organic substances, mainly nitrogenous. The mineral salts are chlorides, sulphates, and phosphates. The chief chloride is common salt, which varies in amount according to the amount in the food. The sulphates are formed by the oxidation of the sulphur contained in many of the protied substances used as food. The phosphates come partly from the food and partly by the oxidation of phosphorus-containing substances in the tissues. The most important of the nitrogenous products in the U. is *urea* (CH_4N_2O), which contains about 90 per cent. of the total nitrogen excreted. U. is formed in the liver from the amino-acids resulting from the digestion of proteins. About 4 per cent. of the nitrogen in U. is contained in ammonia, which can often be detected by its odour. Other nitrogenous substances present in U. are uric acid, hippuric acid, and creatinin. Uric acid is present in excess in the U. of gouty patients. The amount of U. discharged by an adult man is about 2½ pints *per diem* on the average. The quantity, however, is susceptible of wide variation, as it depends to a large extent upon the amount of fluid ingested, the amount excreted by the skin and lungs, etc. The excretion of U. also varies with the state of bodily health. *Polyuria*, or excessive discharge of U., may be caused by the use of one of the drugs known as diuretics, by diabetes mellitus, or by diabetes insipidus. A decrease in the amount of U. is caused by certain fevers, by forms of kidney inflammation, from obstruction in the urinary passages, etc. Abnormal constituents in the U. are often indicative of morbid conditions. A condition marked by the presence of blood or blood pig-

ment is known as *hæmaturia*. This is indicative of injury or inflammation in kidney, ureter, bladder, or urethra. If the flow of blood only occurs at the beginning of micturition, the lesion is probably in the urethra. Where long clots are observed, the trouble is probably in the ureter. *Pyuria* is a condition characterised by the presence of pus in the U. If the U. is alkaline the pus probably originates in the bladder; if acid, pyelitis, or inflammation of the pelvis of the kidney, is indicated. *Albumen* is present in the U. when the kidneys are diseased, and sometimes when no definite lesion can be ascertained. Its presence may be detected by the addition of a coagulating agent, as nitric acid, to the U. *Sugar* may be detected by means of Fehling's solution. Its presence is indicative of diabetes mellitus. *Bile* may be present in cases of jaundice, giving a brownish appearance to the U. Among other abnormal aspects of urination are incontinence and retention of U. *Incontinence* in children is usually a matter of nerves. The micturition-centre is not properly under control, so that the child passes water without its own knowledge. This is apt to occur at night, and sometimes the habit remains very obstinate. The child should not be scolded as if for a fault. He should be encouraged to pass water just before going to bed, and should not be allowed to drink much fluid towards night time. If the habit continues unchecked, small doses of belladonna should be administered. In adults, incontinence of U. may be due to over-distension owing to stricture of the urethra. It may be cured by treating the stricture. In women, incontinence of U. is often an accompaniment of hysteria. *Retention* of U. is sometimes, like incontinence, of purely nervous origin. Often, however, it is due to obstruction in the urethra, by the impaction of a stone or other cause. The bladder becomes enormously distended and can be felt as a hard ball rising up in the abdomen. If the obstruction proves impervious, the bladder must be punctured and the U. drawn off by an aspirator through the abdominal wall. Where the retention is due to paralysis of the bladder and there is therefore no urethral obstruction, the U. may be drawn off by a catheter. See A. R. Cushny, *The Secretion of the Urine* (2nd ed. rev. 1926); W. E. Irwin, *Urinary Surgery* (2nd ed. rev. 1927); L. Heitzmann, *Urinary Analysis* (5th ed. rev. 1928).

Urmia, see URUMIAH.

Urodela, see CAUDATA.

Urology is the study of the structure, affections, and diseases of the genito-urinary system. The chief

parts of the urinary system are the kidneys, ureters, bladder, and urethra. The function of the kidneys is to remove from the blood excess water and soluble waste matters such as urea, uric acid, and other nitrogenous compounds. Any impairment of function is the concern of U. and may be due to abnormalities in the development, number, and position of the kidneys. Rarely, only one kidney is present and any interference in the function of this is most serious. Occasionally an extra kidney is developed, and, being usually unprovided with adequate drainage, is more liable to disease or to blockage. In addition to abnormalities, displacements, and injuries, kidneys may be affected by syphilis (*q.v.*), tuberculosis (*q.v.*), pyelonephritis, tumours (*q.v.*), hydronephrosis, and other diseases. The chief abnormalities of the ureters, the ducts conveying the urine from the kidney to the bladder, are dilatations and constrictions; abnormal bends and twists; the origin of the ureter from a position too high to drain the kidney; blind endings and the opening of the ureters into parts of the genito-urinary system other than the bladder. Ureteritis is frequently associated with infection of the kidney. Not infrequently the passage of the ureter is partially or completely blocked by calculi, by tumours, and by strictures due to various infections. Some anomalies of the bladder, particularly exstrophy, increase the possibility of the growth of a carcinoma (see CANCER). Rupture of the bladder interferes with the outlet of the urine, which has to be drained by means of a catheter. Cystitis, infection of the bladder, is favoured by the presence of tumours, calculi, and other obstructions. Amongst the chief causes of cystitis are venereal diseases (*q.v.*), bilharziasis (*q.v.*), and catarrh. Chemical cystitis may be induced by injection of strong alkaline and acid solutions. Diseases of the genito-urinary system are frequently associated with neuroses. These may be the cause of such physiological manifestations as dysuria, enuria, urgency, retention, pollakiuria, impotence, and sterility. Conversely, any of these affections due to injury, abnormality, or disease may be the cause of a neurosis. Abnormalities of function may also be produced by disturbances of the endocrine system. Genital diseases are of particular importance since they affect the health, not only of the individual, but also of the next generation, and they may result in complete sterility. Organisms from a mother

infected with venereal disease, particularly with gonorrhoea (*g.v.*), are likely to infect the child during parturition. U. is concerned with defects in the development of spermatozoa, with faults of insemination, and with the production of secretions harmful to semen in either the male or female passages. The study of the genital abnormalities and diseases of women is a specialised branch—gynaecology (*g.r.*).

Consult D. N. Eisendrath and H. C. Rolnick, *Textbook of Urology* (2nd ed. rev. 1930); E. L. Keyes, *Urology* (1928).

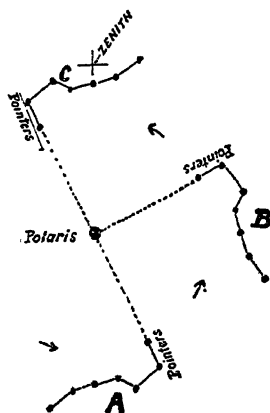
Urotropin, a white crystalline solid made by the action of ammonia upon formaldehyde solution. It is used as a diuretic and urinary antiseptic. Chemically it is known as hexamethylenetetramine, formula $C_6H_{12}N_4$.

Urquhart, David (1805–77), a British diplomatist, b. at Bracklangwell, Cromarty, and educated at St. John's College, Oxford, after having spent some time in France and Spain. He took part in the Gk. War of Independence, and in 1835 was made Secretary to the Legation at Constantinople. He held this position for two years, at the expiration of which he made an extensive tour in the East, with a view to collecting evidence against the policy of Palmerston. In 1847 he entered parliament in opposition to Palmerston's ministry. His political publications are numerous and include: *Turkey and its Resources*, 1833; *Letters and Essays on Russian Aggression*, 1853; *The Occupation of the Crimea*, 1854.

Urquhart, Sir Thomas (1611–60), a Scottish author and translator, educated at King's College, Aberdeen; his education being completed with the usual Continental tour. During the Civil War he fought and underwent imprisonment for Charles I., but of the latter years of his life very little is known. In 1652 he pub. his *Ἑσπεριόβαλρον*, better known as *The Jewel*. In the following year was pub. the first part of the work that has made his name famous, the translation of Rabelais, one of the most perfect translations ever made. It has been reprinted in the Everyman's Library, 1929.

Ursa Major (the Great Bear), the best known of all the constellations, is popularly known as The Wagon (Charles's Wain), the Plough, and, in America, the Dipper. The constellation can be found quite easily, for it is never below the horizon in Britain. It is a useful guide to finding the Pole Star, the nearest bright star to the celestial pole. This star is found by projecting a line joining

the two right-hand stars of the seven bright stars which form the stellar framework of the Bear. For this reason these two stars are known as 'the Pointers.' By continuing the sweep of the tail of the Bear (or handle of the Plough or Dipper) the bright star Arcturus (*g.v.*) is reached,



THREE POSITIONS OF THE GREAT BEAR ROUND THE POLE STAR

a name by which the Bear has sometimes been called. ζ-Ursæ Majoris (or Mizar), the first recorded double star, is a spectroscopic binary with a period of 104 days and a velocity of 100 m. per second. The proper motions of all the principal stars except Alpha are almost identical.

Ursa Minor (the Little Bear), a small constellation chiefly remarkable for the fact that Polaris (the Pole Star) is situated at the end of its tail. The parallax of Polaris was found by Mr. C. A. F. Peters to be 0.076, which indicates a distance in light-years of 42.45.

Ursula, Saint, of Cologne, is said by the anct. legend to have been put to death at this place some time in the third, fourth, or fifth century by the Huns, together with eleven thousand virgins, her companions. Even in the Middle Ages this popular story was viewed by many with suspicion and it is now universally recognised that the greater part of it is fabulous. There is no certainty as to the origin of the legend.

Ursulines, an order of nuns in the Rom. Catholic Church founded about 1537 by Angela da Brescia (c. 1511–

40). Its institution was confirmed by Paul III. in 1544, and it was at this time that the order received its name, from that of its patron, St. Ursula. The nuns are employed in educational work.

Urticaceæ, an order of dicotyledons, known to us chiefly because it contains the stinging-nettles. Most of the species are herbaceous or shrubby, have no latex, and often have stinging-hairs; the leaves are usually alternate and stipulate. The perianth consists of from four to five free or united leaves, and the unicellular ovary contains one ovule. *Urtica*, *Parietaria*, and *Boehmeria* are the chief genera.

Urticaria, see NETTLE-RASH.

Uruguay, known as the *Republica Oriental del Uruguay*, the smallest republic in S. America, situated between Brazil and Argentina, on the Atlantic coast. Its area is 72,150 sq. m. The surface consists of a level plain traversed in the S. by low ranges of hills and bounded on the N. by mountain ranges, including the Cuchilla de Haeda to the W. and the Cuchilla Grande in the E. The chief rivs. are the Uruguay and the Negro. U. has a beautiful climate, and therefore the vegetation is very rich. Wheat, oats, barley, maize, linseed, olives, grapes and other fruits, and tobacco are cultivated. The best area for agriculture is on the Rio de la Plata, E. of Montevideo. Cattle and sheep rearing is, however, the principal occupation, 88 per cent. of the total area of the country being devoted to this purpose, and live stock, meat, and wool exported to Brazil, U.S.A., France, and Great Britain. From U., too, is obtained the meat extract used at the Liebig factory, the refuse also being exported as a manure. The well-known canned beef comes from the frigorificos at Fray Bentos. Skins of various fur-bearing animals, notably nutria and seal-skin, are collected for market and exported. Whaling is carried out from Monte Video, the winter anchorage of some British and Scandinavian whaling flotillas. Lead, copper, manganese, and a little gold and silver are mined, talc mines are active and marble and granite are quarried. Coal was discovered in the Department of Cerro Largo in 1922, but most of the coal, oil and firewood used is imported. Manufactures are small, but growing rapidly under a protective tariff. They include woven and knitted cotton goods, jute bags, cordage, flour and biscuits, glass and bottles, cement, leather, boots, cigars, disinfectants, wine, beer and spirits, and a large range of chemicals, including alcohol, sodium salts,

chloroform, and collodions. The imports include cotton and woollen goods and machinery. Monte Video, pop. (1930), 655,389, is the cap. and the chief port. Other tns. are Salto (30,000), Paysandu (28,000), and Mercedes (23,000). Transport facilities are good, there being many railroads, tramways, and roads, as well as the rivs., which are navigable for hundreds of m. The gov. is vested in a senate, consisting of nineteen members, and a chamber of representatives, chosen by the people in the ratio of one to every twelve thousand voters. The president is elected for four years, and is assisted by a national administrative council of nine members elected for six years. In 1919 a new constitution separating church from state was adopted and in 1921 votes were given to women. Precautions are taken to prevent the state from adopting a dictator. Primary education is compulsory; there were some 1500 schools in 1928, and in 1927 the university inaugurated at Montevideo in 1849 had 10,072 students. There is complete religious liberty. The original inhabitants were pure Indians. The country was first visited by Europeans in 1515. Cattle were first introduced in 1580. A century later the Portuguese founded a settlement, and later the country was held by the Spaniards, in 1777 forming part of the viceroyalty of Buenos Ayres; afterwards it came under the dominion of Portugal, and was attached to Brazil. When Brazil declared its independence of Portugal, Portugal strove to retain U., but on the mediation of Great Britain, U. was formally constituted as a republic in 1830. Then followed a period of civil strife. Spanish is the official language. Pop. (1930), 1,903,083. See R. J. Enoch, *Republics of South America*, 1913; M. J. G. Ross, *Argentina and Uruguay*, 1917; W. Parker, *Uruguayans of To-day*, 1921; J. Supervielle, *Uruguay*, 1928.

Uruguayana, a tn. of Brazil, on the Uruguay R., in the prov. of Rio Grande do Sul. It is a railway junction and an important centre of the cattle industry. In 1817 the battle deciding the independence of the Uruguay Republic against the Portuguese was fought here, whilst here in 1865 Estigarribia surrendered to the Emperor of Brazil. Pop. (1920) 21,000.

Urumia, **Urmia**, or **Daria Shah**, a lake of Persia, in the prov. of Azerbaijan, situated in a depression between the mountains at a height of 4500 ft. It is very salt and is fed by the Aji Chai, Jaghatu, Tatan, and Zula. Its outlet is unknown. Its

length is about 90 m., breadth 20-30 m., and area 1600 sq. m.

Urumiah, Oroomiah, or Urmia, a tn. in the Persian prov. of Azerbaidjan, 70 m. S.W. of Tabriz. It is a summer resort, the see of a Nestorian bishop, and is supposed to have been the birthplace of Zoroaster. It was the scene of fighting between the Turks and Russians during the Great War. Pop. 20,000.

Urumtsi, or Urumchi (Chinese *Tik-wa Chou*), a tn. of Zungaria, China, 320 m. E.S.E. of Kulja. It is surrounded by double walls and is the headquarters of the Chinese gov. in Turkestan; it commands the only defile suitable for artillery between Zungaria and E. Turkestan. Pop. 30,000.

Urville, J. Dumont D' (1790-1842), see DUMONT D'URVILLE.

Usbeks, see UZBEKS.

Uses, in law, the benefit or profit of lands considered as detached from and opposed to the legal ownership, or seisin (*q.v.*). Use implies a trust or confidence reposed in some one for the holding of lands, and all modern conveyances are directly or indirectly founded on the doctrine of U. and trusts, which doctrine has rightly been regarded as the most technical and intricate part of the real property law of England (*cf.* SCINTILLA JURIS). The doctrine was a purely equitable one, and was employed by ecclesiastical corporations to evade the statute of mortmain (see CHARITABLE TRUSTS; and MORTMAIN), and by landowners to evade feudal burdens, or to make land devisable by will at a time when that was impossible by common law (*q.v.*). The effect of the statute of U., 1535, the object of which was, by *executing* the use or turning it into the full legal estate, to circumvent the above devices, was not what the legislature had hoped: because the courts soon held that only the first and not subsequent uses was executed; hence if A left land 'to B to the use of C to the use of D,' C had the legal but D the beneficial ownership. These judicial decisions defeated the main policy of the statute, and restored U. under the now more familiar name of trusts, and hence brought about the whole modern system of 'equitable estates.' If land be conveyed to A to the use of B, B has the possession vested in him; but if the conveyance be to A, to the use of B *in trust* to permit C to enjoy the profits, B has the legal, but C the *equitable*, estate (*q.v.*). U. apply only to lands of inheritance and therefore are inapplicable to leaseholds. *Springing use* is one limited to arise on a future event where no preceding use is limited.

For example, if A seised in fee grants 'to B upon A's own marriage to hold to the use of A for life with remainder to A's first and other sons in tail,' life estates and remainders 'spring' up by way of use on the event of A marrying (see SETTLEMENT). *Shifting use* is one which, though executed, may change or shift to another person by circumstances. For example, if A grants 'to B upon A's own death to hold to the use of C, and his heirs, but if C do not within three years take the name and arms of A, then to use of D and his heirs,' the land goes to D if C does not fulfil the condition mentioned. *Contingent use* or remainder is one limited (see LIMITATION) to a person not ascertained, or upon an uncertain event, but without derogation of a prior U. *Resulting use* is one which expires or cannot vest, and therefore is said to result or return to him (or his heirs) who created it.

Ushak, a tn. of Turkey in Asia, in the vilayet of Brusa, 55 m. N.E. of Alashehr, and connected by rail with Smyrna and Koma. It is famous for pile-carpet weaving. Pop. 16,880.

Ushant (Fr. *Ouessant*), an island in the dept. of Finistère, France, 27 m. N.W. of Brest. It has steep coasts, with a fertile soil; fishing is the chief industry, and the small port of Ouessant on the S.W. is the only tn. There are two lighthouses and a telegraph and a life-boat station. Area 20 sq. m.; pop. (1926) 2524. There were two battles fought off Cape U. in the eighteenth century. The first was between the Fr. under D'Orvilliers and the Eng. under Keppel in 1778 and was indecisive. The second was fought the 'Glorious First of June, 1794,' when Admiral Lord Howe gained a great victory over the Fr. under Villaret-Joyeuse, capturing seven vessels.

Ushas, the Hindu goddess of the dawn to whom beautiful Vedic hymns are addressed. She is the life and breath of all things. She is born afresh each day, and has ruddy steeds yoked to her shining car.

Usher (or Ussher), James (1581-1656), an Anglican theologian, prelate, and scholar, b. in Dublin and educated at Trinity College, Dublin, where he took the degree of M.A. in 1600. In 1603 he was made chancellor of St. Patrick's Cathedral, Dublin, and from 1607 to 1620 was regius professor of divinity at Trinity College. In the latter year he became bishop of Meath, and in 1624 archbishop of Armagh and primate of Ireland. He sided with Charles I. in the Civil War, consequently losing much of his property in Ireland. He was preacher to the Society of Lin-

coln's Inn from 1647 until just before his death. His scholarship was great and his *Annales Pêteris et Nori Testamenti* proposed a scheme of biblical chronology universally accepted at the time.

Usk, a par. and market tn. of Monmouthshire, England, situated on the G.W.R., $\frac{3}{4}$ m. E. of Pontypool and 12 m. S.W. of Monmouth. There is an old castle, and the church was originally attached to a thirteenth-century Benedictine nunnery. Pop. (1931) 1315.

Usk, a riv. of Brecknock and Monmouth, flowing S.E. into the Bristol Channel at Newport. It has a length of 37 m. and is noted for salmon.

Usufruct, in Rom. law, the temporary use and enjoyment of lands or tenements, or the right of receiving the fruits and profits of lands or personal property belonging to another, without having the right to alienate or change the *corpus* or property itself. The *usufructuary's* rights, when in the nature of *personal* as opposed to *predial* servitudes, necessarily subsisted only so long as the substance of the thing used remained unimpaired.

Usury, formerly denoted any legal interest for the use of money, but in present usage denotes only illegal or excessive interest. See INTEREST and MONEYLENDER.

Utah, since 1896 a state of the American Union and confined by Nevada (W.), Idaho and Wyoming (N.), Colorado (E.), and Arizona (S.). The Wasatch Mts. (highest peak Timpanogos, 11,957 ft.) shut off the western section, which belongs to the Great Basin of the continent and consists of highlands running N. to S. separated by valleys of desert wastes, from the eastern, which belongs to the Colorado basin, and is remarkable for its lofty plateaus through which great cañons carve their passage. The Vinta Mts., though an offshoot of the longer range already mentioned, contain the greatest elevations in the state, the culminating summit being King's Peaks (13,498 ft.). Rainfall is very scarce and the climate is one of extremes. Every attempt is being made to reclaim by irrigation the vast tracts of unfertile soil, and 1,300,000 acres are thus watered at present. It is estimated that dry-farming can be carried on over several millions of acs. having a small rainfall, but capable of irrigation, for it contains all the elements of fertility and usually shows good results. There are over 6000 m. of main ditches, 5300 m. of lateral ditches and 1,600,000 ac.-ft. of irrigation reservoirs. The chief crops are wheat, much of which grown on such land

is far superior to that grown in more humid conditions, oats, potatoes, rye, corn, barley, and hay, of which 1½ million tons were produced in 1929; but the growth of nursery produce and fruits is now encouraged. The chief fruits are apples, grapes, peaches, and pears. U. ranks fourth in the U.S.A. for the production of green peas for canning and fifth for the production of sugar beet. Cattle-raising engrosses much attention, and sheep-raising is important. In 1929 the state was sixth in the production of sheep and fifth in the production of wool, the clip weighing over 19 million pounds. The wonderful development of U.'s agricultural resources has caused the mining industry, though increasing in value, to take second place. Copper, and after that silver, coal, lead and gold, are the most valuable minerals. The manufacture of flour and of railway cars, and also printing, are the chief industries, but there are copper and lead smelting works, and beet-sugar factories, canning and preserving of fruit and vegetables, grain and flour mill products, slaughtering and meat-packing, the manufacture of butter, cheese, and confectionery. Brigham Young and his 150 followers (see MORMONS) entered Salt Lake Valley in 1847. In twelve months he had a following of 5000, and in 1848 U. was ceded to the U.S.A. by Mexico, and was organised as a territory in 1850. On Jan. 4, 1896, it was admitted as a state into the Union. It is ruled by a Senate and House of Representatives and sends two representatives to Congress. Indian reservations occupy 531 sq. m. and 25 million acs. are still unappropriated. In 1849 the colony of Deseret (including U., Arizona, Nevada, and parts of California, Colorado, New Mexico, and Wyoming) was established with Brigham Young as governor. U. was made a non-slave territory in 1850, and the polygamy of Mormonism was attacked on all sides. On this account U. was not admitted to statehood until 1896. A notable feature of U. is the Great Salt Lake. It is 80 m. long, 25 m. wide and almost 20 per cent. salt. School attendance is compulsory between eight and sixteen years of age. There are the agricultural college at Logan, the Brigham Young University at Provo, as well as many other colleges. Area 84,990 sq. m.; pop. 507,847, the chief cities being Salt Lake City, 140,267; Ogden, 40,272; Provo, 14,766. See L. G. Young, *The Founding of Utah*, 1924.

Utakamand, or Ootacamund, a municipality and tn. in the dist. of Nilgiri Hills, Madras Presidency, British India, 36 m. N.N.W. of

Coimbatore. It is pleasantly situated at a height of some 7000 ft. above the sea, and is the principal sanatorium and summer resort of the presidency. The Lawrence Asylum, the botanical gardens, Hobart Park, recreation grounds, and gov. cinchona plantations are the chief features of the tn., in addition to the large artificial lake (1½ m. in length). Pop. 20,000.

Utamaro (1754-1806), a Japanese artist of the Ukiyoe school, known chiefly by his coloured wood-cuts, b. at Yedo; he was the son of a painter of distinction, Toriyama Sekiyen. While still a boy he manifested a taste for dissipation, and, being disowned by his father in consequence, he went to live with a famous print-seller, Tsutaya, and thenceforth his life was mainly devoted to depicting the beauties of the Yoshiwara, while he also issued a series of drawings of insects. His work gradually became very popular, his fame penetrating even to China; but in 1804 he issued a print libelling the reigning Shogun, and accordingly he was put in prison, where he d. U. was probably the first Japanese artist to become well known in Europe, many of his prints being sent there during his lifetime by Dutch merchants resident at Nagasaki. As a draughtsman he has few rivals. See Ricketts, *Pages on Art* (London, 1913); Life, by Edmond de Goncourt (Paris, 1891).

Uta-Napishtum, see ZIUSUDRA.

Uterus, or Womb, the organ in which the development of the ovum takes place. It is a pear-shaped organ, flattened and about 3 in. long in the non-pregnant condition. Its position is between the bladder and the rectum, with the base directed forwards and upwards; the cylindrical neck or *cervix* is directed towards the vagina, with which it communicates by the *os uteri externum*. This orifice is small and elliptical in the virgin, but after pregnancy remains much wider. The wide portion, or *fundus*, of the U. receives the Fallopian tubes at its two upper angles. The fundus is triangular in form, the apex being a constriction called the *os uteri internum* leading to the cervix. The walls of the U. consist of mucous membrane as its inner surface continuous with that of the vagina, a thick layer of muscular tissue, and an outer surface of peritoneum. The peritoneum is reflected outward to the wall of the pelvis and forms a means of suspension for the organ. This arrangement not only provides, but also allows for considerable distension in pregnancy. During the period of sexual activity, from puberty to the menopause, the U.

discharges about 6 oz. of blood and mucus at intervals of twenty-eight or thirty days. The chief function of the U. is, however, the development of the fertilised ovum. The ova are carried from the ovary to the U. by way of the Fallopian tubes. After the ovum has been fertilised, it depends for the nourishment necessary for development on the U., which is furnished with structures adapted to that end and for carrying away the waste products of the foetus. The U. is the seat of many disorders, which are dealt with in that branch of medicine known as gynaecology. Owing to its mobile situation, the organ is subject to many varieties of displacement. Flexion, whether an excessive bending forward or a reversal of the normal flexion, leads to difficulties of menstruation and possible sterility. Inversion is caused by difficult parturition or by the presence of a polypus. Prolapse occurs when the U. is engulfed into the vagina; it may even protrude through the vulva. After being replaced by the fingers it should be kept in position by a pessary. Inflammation of the mucous lining of the U. is called *endometritis*. It is due to the extension of infective inflammation from other structures, or to sepsis following the expulsion of the foetus. Treatment consists of irrigation with antiseptic fluids, with care of the general health. The U. is a very common seat of tumours, both benign and malignant. Fibroids or myomata may persist for years without giving indications of bad health. On the other hand, they may cause sterility or lead to excessive hæmorrhage. Cancer of the U. is most common towards the climacteric period. Hæmorrhage or enlargement may indicate the existence of a growth. Surgical treatment at an early period of the disease often leads to a cure.

Utica, an anct. city of N. Africa, situated 25 m. N.W. of Carthage in the present dist. of Tunis. It was founded by the Phœnicians in 1101 B.C., and after the destruction of Carthage (146 B.C.) rose to be the first city of Africa, and cap. of the Rom. prov.

Utica, a city and co. seat of Oneida co., New York, U.S.A., on the R. Mohawk. It is a railway and canal centre, and has manufs. of cotton goods, hosiery, engines, etc., iron and brass castings, fire-bricks, boots and shoes, etc. Pop. (1930) 101,740.

Utilitarianism may be summarised by its own catch-phrase, 'the greatest happiness of the greatest number,' such happiness being the criterion of ethical right and wrong, and pleasure and freedom from pain the only de-

sirable ends of life. Although the term originated with Bentham as a purely philosophical and political expression, the theological line beginning with Bishop Cumberland (*De Legibus Naturae*, 1672), and including John Gay and Abraham Tucker, and ending with Paley, had already covered the same ground from the purely ethical point of view, identifying happiness with virtue. U. proper began with Bentham, whose *Principles of Morals and Legislation* (1789) must be regarded as the origin of the movement which culminated in John Stuart Mill. J. S. Mill defined U. on more broadly sympathetic and less selfish lines than Paley and Bentham, as 'the creed which accepts as the foundation of morals utility, or the greatest happiness principle, holds that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness.' Morality, he says, consists 'in conscientious shrinking from the violation of moral rules, and the basis of this conscientious sentiment is the social feelings of mankind, the desire to be in unity with our fellow-creatures.' A new aspect of U., considered on biological or evolutionary grounds, was pointed out in Darwin's *Descent of Man*, and followed up by Herbert Spencer and Sir Leslie Stephen. The name of Henry Sidgwick (*The Methods of Ethics*, 1874) must also be mentioned in connection with purely philosophical U. See Sir Leslie Stephen's *English Utilitarians*, 1900; Albee's *History of English Utilitarianism*, 1902; and J. S. Mill's masterly *Utilitarianism*, 1863 (reprinted in Everyman's Library), the best exposition, philosophical and literary, of the doctrine of U.

Utopia (nowhere; Gk. οὐ, not, and τόπος, place) was the name given by Sir Thomas More to the imaginary island described in his *De Optimo Reipublicae Statu, deque Nova Insula Utopia*, pub. in Latin in 1516, and translated in 1551, by R. Robinson. This romance speedily attained considerable popularity, and from it the adjective Utopian has been formed to mean 'impracticable,' or 'ideal,' particularly as applied to schemes for improving social conditions.

Utrecht: (1) A prov. of the Netherlands. The soil is sandy and sterile in the E., but more fertile in the W. Area 529 sq. m. Pop. (1928) 393,629. (2) The cap. of the prov. of Utrecht, is situated on the Old Rhine, 35 m. E. of The Hague. It is the seat of a Rom. Catholic and of the Old Catholic archbishopric. Among the principal buildings are the remains of the cathedral (damaged by a hurricane in 1674), the university (founded

1636), and an archiepiscopal museum. The chief manufs. are cloth, woollen goods, carpets, pottery, organs, chemical products, needles, gin, etc. U. is very anct., being known to the Roms. as Trajeretum ad Rhenum; it was the residence of the powerful prince-bishops of the eighth century and after, and also of the Ger. emperors. The Treaty of Utrecht (1713) was signed here, ending the War of the Spanish Succession. Pop. (1928) 151,648. (3) A tn. of Natal, S. Africa. Fruit growing and stock-raising are carried on, wool is produced and there are rich coal mines. The tn. is the cap. of the dist. of Utrecht, which was annexed to Natal in 1903. Pop. 1848.

Uttoxeter, a tn. of Staffordshire, England, situated 12 m. N.E. of Stafford. Hardware manuf. is carried on. Alleyn's grammar school was founded in the sixteenth century. Until the early seventeenth century U. was attached to the Duchy of Lancaster. It was formerly a part of the property of the Earls of Mercia, and then of the Ferrers family. Pop. 5500.

Uvula: (1) A small cone-shaped hanging process suspended from the middle of the lower border of the soft palate. It is formed by the azygos uvulae, levator palati and tensor palati muscles, mucous membrane, and connective tissue. (2) A small offshoot of the inferior vermis of the cerebellum, constituting the posterior limit of the fourth ventricle. (3) A slight elevation of mucous membrane projecting from the anterior and lower part of the bladder to the urethral orifice. This is known as the uvula vesicae.

Uxbridge, a par. and market tn. of Middlesex, Eng., situated on the R. Colne. Brewing, brick-making, iron-founding, and market gardening are carried on. Here in 1645 the unsuccessful negotiations between parliamentarians and royalists took place. Pop. with urban dist. (1931) 31,866.

Uzbegs, or **Usbegs**, form a branch of the Turkish family of Tartars. They are supposed to be of Uigur origin, descended from a tribe which migrated from Kashgaria to Western Turkestan. Their blood is mixed in different localities with Aryan, Kiptchak, Kalmuck and Kirghiz elements, and as a people they are socially and politically, rather than ethnically, distinct. In Khiva, Bokhara, Khokand, and other places they form the chief part of the native pop., are the influential class, and were dominant until the middle of the nineteenth century, when the Russians arrived and became supreme. The U. speak Jagatai Turkish. After the Russian Revolution the Uzbeg territory became

the Bokhara Soviet Socialist Republic. On Dec. 5, 1924, these two republics became part of the Uzbek Soviet Socialist Republic (Uzbekistan) and the Turkoman Union Republic. The land was formerly included in Turkistan, Bokhara, and Khorezm. Uzbekistan was accepted into the Soviet Union as an Autonomous Republic in May 1925. It is divided into ten provs. Uzbekistan is bounded on the N. by the Kazah Autonomous Republic; on the E. by the Kirghiz Autonomous Republic, and Chinese Turkistan, on the S. by Afghanistan, and on the W. by the Turkoman Soviet Socialist Republic. It has twenty-three tns.; the cap. of the republic is Tashkent, with a pop. in 1930 of 702,000, and a university, established 1919. Other important tns. are Bokhara, Khux, Andjan, Khokand, Samarkand. The climate is rather dry, and extreme, hot in summer and cold in winter. The main occupation of the inhabitants of Uzbekistan is intensive farming using artificial irrigation. Cotton is grown with some success, and fruits, wool, and silk are also produced. The chief industries are cotton-spinning, and oil and coal-mining. The main railway connecting Central Asia with Russia passes through Uzbekistan, and the air-line connecting up Central Asia is particularly well developed in this republic. Area 174,686 sq. m. Pop. (1930) 4,545,000. See E. R. Christie, *Through Khiva to Golden Samarkand*, 1925; A. L. Strong, *Red Star in Samarkand*, 1930.

Uzbekistan (U.F.S.R.). A constituent state of the Russian Union of Soviet Socialist Republics. It is an independent republic which, after the Great War, adopted the Soviet form of gov. and became federated with the gov. of Russia. The old kingdom of U. was formed of the territories of Bokhara (*q.v.*) and Khiva in Central Asia, which, prior to the revolution of 1917, were under Russian suzerainty. The modern state of Bokhara was founded by the Uzbeks (*q.v.*) in the fifteenth century, but that part of it which is now called Syr Daria was annexed by Russia in 1866. The Amir of Bokhara was driven out of the country following the revolution, in 1919, when a Soviet gov. was established. In 1925 U. became an equal member of the Soviet Union. U. is bounded on N. by Kazakhstan (*q.v.*), S. by Afghanistan, E. by the Kirghiz Republic and Chinese Turkistan, and W. by the Turkoman Soviet Socialist Republic. Area 170,000 sq. m. Pop. 4,580,000. The majority being Mohammedan Uzbeks. The chief products are rice, wheat, fruits, cotton, silk and hemp; and production is enhanced by intensive farming and irrigation. There are cotton-spinning factories; oil and coal-mining are also carried on. There are over 1000 m. of railway, including branches to Jalalabad, Andjan and other centres. The cap. is Tashkent (*q.v.*). Other tns.: Samarkand, Andjan, Bokhara, Khokand, and Namanchan.

V, as pronounced by the Eng. is the pressed or medial labial aspirate, bearing the same relation to *f* that *b* does to *p*. Its form is only a variety of the character by which the vowel U is denoted, the latter being in its origin the cursive character employed with soft materials, while V is better adapted for writing on stone. The Rom. letter U was probably pronounced as a *w*, a supposition which would explain the fact that in the alphabet of that language one character is employed for both U and V. The converse of this appears in the Ger. alphabet, where *w* has nearly the power of *v*, while the latter symbol is used to designate the sound of the Eng. *f*. V is interchangeable with *b* and *m*. It is also interchangeable with *f*, and hence the confusion between the characters *f*, *v*, and *w*. In chemistry, V is the symbol for one atom of vanadium, and is also frequently used as a contraction for 'volume.'

Vaal, a riv. of S. Africa, trib. of the Orange R., which rises in Mt. Klipstapel, flows W. and S.W., separating the Orange Free State from the Transvaal, and crosses Griqualand W. A weir 1100 yds. long has been made across it at Parys for the purpose of irrigating about 2000 acs. of land. Important diamond diggings are in and near the bed of this riv.

Vaccinaceæ, a natural order of small shrubby plants with bell-shaped flowers followed by juicy acid berries, among which are the cranberry and whortleberry or bilberry.

Vaccination, the inoculation with cow-pox in order to afford protection against small-pox. The idea of vaccination first occurred to Dr. Edward Jenner (1749-1823) in connection with a belief popular in his native county of Gloucester, that persons infected with cow-pox were thereby rendered immune from small-pox. His views met with opposition among medical men of the best reputation, and it was not until 1798 that he succeeded in demonstrating that vaccinated subjects were immune, at least for a time. V. was made compulsory in Bavaria in 1807, Denmark

in 1810, Sweden in 1814, Prussia in 1835, United Kingdom in 1853, and the Ger. Empire in 1874. There is no Federal law compelling V. in the U.S.A., but many of the states enforce it. It is claimed that the decrease in the incidence and in the virulence of small-pox is due to the practice of V. A most cogent fact is that whereas small-pox was formerly a disease more especially of childhood, the young and therefore freshly vaccinated have been seldom attacked in recent epidemics. Again, hospital attendants and medical men who are re-vaccinated at intervals have not been known to contract the disease. The opponents of V., besides resisting the interpretation that V. is the main factor in the diminution of small-pox cases, point to the fact that erysipelas and even syphilis have been caused or communicated by cow-pox inoculation. Now that the use of glycerinated calf lymph is general, the danger of syphilis is obviated, and it is generally conceded that the marked good effects produced by the general practice of V. more than compensate for the remarkably few cases in which the inoculation terminates unfortunately. The law of England now requires parents to procure the V. of their children within six months from birth, unless they have within four months of birth satisfied a court of petty sessions that they have a conscientious belief that such V. will be injurious to the health of the child.

Vaccination Acts. In Eng. the first Vaccination Act, passed in 1840, provided means of vaccination, at the public cost, for every person in the United Kingdom, but left it optional whether he should avail himself of his statutory advantages. The next Act, that of 1853, made vaccination compulsory in England, and in 1861 the Poor Law Guardians were authorised to appoint persons to initiate and conduct proceedings for the purpose of enforcing obedience to the Vaccination Acts. Therewas widespread opposition to the principle of compulsory vaccination, which opposition continued with varying phases of fortune even after the passing of

the Act of 1893, which recognised the counter principle of conscientious objection. In the meantime the Consolidating and Amending Act of 1871 was passed, empowering the Local Gov. Board (now Ministry of Health) to make regulations for carrying out the Vaccination Acts. In 1889 a Royal Commission was appointed to inquire, among other things, into the effect of vaccination in reducing the prevalence of, and mortality from, small-pox. The report of the Commission was on the whole against the contentions of the anti-vaccinators; but in 1893 another Amending Act was passed. The most important provisions of this Act were the extension of the age period of vaccination to six months after birth, the substitution of glycerinated calf lymph for arm-to-arm vaccination or 'humanised lymph,' and, above all, the admission of the new principle that a parent who conscientiously 'objected' should escape the penalty for omission to vaccinate by delivering to the district vaccination officer a certificate signed by two justices, a stipendiary or metropolitan police magistrate, or his conscientious objection. The Bill was passed on Aug. 12, 1893, and though made experimental for five years, has always been renewed by the Expiring Laws Continuance Acts. Anti-vaccination leagues continued to be formed in spite of the Act of 1893, by reason, mainly, of the fact that justices were not readily inclined to be satisfied of the conscientiousness of the objectors, and eventually, in 1907, another Vaccination Act was passed. This provided that the conscientious objector should make a statutory declaration within four months of the birth of the child of his objection, and send such declaration within seven days by post to the district vaccination officer. The functions relating to vaccination formerly discharged by the Poor Law authorities have, since 1930, been discharged by the councils of the cos. and co. bors., as functions relating to public health, and in London, these functions are discharged by the common council of the City of London and by the met. bor. councils (see also POOR LAWS). Under the Therapeutic Substances Act, provision is made for the regulation of the manufacture, sale, and importation of vaccines. See S. M. Copeman, *Vaccination: its Natural History and Pathology*, 1899; J. S. McVail, *Half a Century of Small-pox and Vaccination*, 1919; also *Report of Committee* (H.M.S.O., 1928).

Vaccine-therapy, a method of curing infective diseases by inoculation

with the virus of the causative micro-organisms. The theory owes its origin to Dr. Jenner's discovery of vaccination in the restricted sense; that is, the inoculation of healthy persons with cow-pox in order to render them immune from small-pox. As a result of the pioneer work of Pasteur (*q.v.*) and of Sir Almroth Wright, not only has the method been extended to preventive inoculation of a number of other diseases, but patients have been inoculated while they were actually attacked by the disease, and the history of the method up to the present time shows that it is a valuable addition to therapeutics. The danger to health involved in bacterial infection depends mainly upon the production of toxins or bacterial poisons, which in some cases are extremely virulent. The disease is fought in normal cases by the destruction of bacteria—a work in which the white corpuscles are especially engaged (see PHAGOCYTOSIS)—and by the neutralisation of the toxins by substances called anti-toxins, which are elaborated by the body in some obscure way, under the stimulus of the disease-attack. One injection method involves adding to the antitoxic properties of the blood by the use of anti-toxic sera (see SERUM-THERAPEUTICS). In this method the injected serum contains, not bacteria, but only the anti-toxic substances elaborated by the horse or other animal inoculated with the disease. V., on the other hand, involves the injection of the bacteria themselves or their products. The principle underlying the method is the stimulation of the healing powers of the body generally to conquer a localised infection. Normal human serum has what is called opsonic action on bacteria; that is, it makes them more susceptible to destruction by the white corpuscles. In any particular case of disease the opsonic power of the patient's serum is compared with that of normal serum, the result being a ratio which is called the opsonic index. The fluctuations in the opsonic index afford a valuable indication as to whether the injection of a vaccine is likely to aid in conquering the disease or not. When the opsonic index is rising (positive phase), it is an indication of increased immunity, which can be still further increased by the stimulus afforded by the injection of a dead culture of the micro-organism. When the opsonic index is falling (negative phase), the injections are discontinued.

The preparation of vaccines in Great Britain consists in making cultures of the bacteria on a suitable medium, adding sterilised saline to

form an emulsion, and subsequently heating this long enough to kill the bacteria. Various chemical agents such as formalin and phenol may be employed instead of heat. Before use, the emulsion is standardised by dilution with sterile normal saline until it corresponds with a standard emulsion. Standardisation was originally carried out by counting the number of bacteria per unit volume. When V. was first introduced, autogenous vaccines, *i.e.* vaccines prepared from the bacteria causing the infection, were generally used; in exceptional cases, stock vaccines were employed. The use of the latter has now become much more general, and is of advantage when the infecting bacteria are of the same strain as those in the vaccine. When different strains, such as those of *Bacillus coli*, exist, autogenous vaccine ensures the use of the right strain; others may be useless and even harmful. Whatever its source, *Bacillus typhosus*, the bacterium causing typhoid fever, yields a vaccine giving immunity from typhoid fevers in all parts of the world. *Staphylococcus aureus*, a bacterium causing suppurative, is equally useful in the preparation of stock vaccines, but in many other cases, autogenous vaccines are preferable. The prophylactic use of V. was considerably extended during the Great War, when troops were inoculated against cholera (*q.v.*), typhoid and paratyphoid fevers (*q.v.*), and influenza (*q.v.*). Vaccines are used also as a preventive against plague (see TROPICAL MEDICINE), whooping cough, colds, pneumonia, tuberculosis (*q.v.*). In the case of some infective diseases, such as cholera and plague, re-inoculation must be made frequently, as immunity lasts for only a few months. The value of V. in diphtheria and pyorrhoea has not yet been established (see BACTERIOLOGY).

Consult L. S. Dudgeon, *Bacterial Vaccines and their Position in Therapeutics*; R. Muir and J. Ritchie, *Manual of Bacteriology*, (rev. ed. 1927).

Vachell, Horace Annesley, Eng. author, b. Oct. 30, 1861, educated at Harrow and the Royal Military College, Sandhurst. He has written many novels and plays, and will be remembered especially as the creator of Quinney. Select bibliography: (novels) *Romance of Judge Ketchum*, 1895; *The Quicksands of Pactolus*, 1896; *A Drama in Sunshine*, 1898; *John Charity*, 1900; *The Pinch of Prosperity*, 1903; *Brothers*, 1904; *The Hill*, 1905; *The Face of Clay*, 1906; *Her Son*, 1907; *Quinney's*, 1914; *Fishpingle*, 1917; *Whitewash*, 1920; *Quinney's Adventures*, 1924;

A Woman in Exile, 1926; *Miss Torrobin's Experiment*, 1927; *Into the Land of Nod*, 1931; (plays) *Quinney's*, 1915; *Searchlights*, 1915; *The Case of Lady Camber*, 1916; (other works) *Life and Sport on the Pacific Slope*, 1900; *The Best of England*, 1931.

Vacuum and Vacuum Pump. A vacuum denotes a space which is completely devoid of matter. It is impossible to obtain a perfect vacuum, but modern 'molecular pumps' can reduce the pressure inside a vessel to 10^{-4} mm. of mercury, a pressure of the order of 10^{-3} of atmospheric pressure. Until the time of Galileo, Aristotle's dictum that 'Nature abhors a vacuum' was accepted as a natural principle. Doubts were first cast on this principle during the sinking of a well on the estate of the Grand Duke of Tuscany, when it was found to be impossible to raise the water to a height of 40 ft., the pump employed failing to raise the water beyond 32 ft. Torricelli, being acquainted of these facts, surmised that the space above the water in the tube of the pump was a vacuum. He confirmed his conclusions by inverting a tube full of mercury in a trough containing the same liquid, when he found that the height of the mercury in the tube was about 30 in., equivalent to the height of the water in the Grand Duke's pump. The space above the mercury was called a *Torricellian vacuum*, though it was really saturated with mercury vapour at a low pressure. The first effective air-pump was invented by von Guericke about 1650 and a modification of his arrangement was constructed in England by Boyle and Hooke in 1659. The most remarkable high-vacuum pumps of to-day are those invented by Gaede and Langmuir. The mode of action of Gaede's pump is as follows: a rapidly rotating cylinder is mounted inside a fixed cylindrical case whose internal diameter is only slightly greater than that of the moving cylinder. Two tubes are fixed to points *A* and *B* in the outer cylinder, the former communicating with the vessel to be exhausted and the latter to a vessel previously exhausted by an ordinary pump to a pressure of the order of a millimetre of mercury. The rotating cylinder revolves from *A* to *B* and the molecules of gas entering at *A* are carried along to *B* and the pressure in the vessel connected to *A* is rapidly reduced to the order of 10^{-4} mm. of mercury. Langmuir's mercury vapour pump is similar in principle to the ordinary filter pump used in chemical work. Mercury vapour is generated from

mercury boiling under reduced pressure at the base of a tube and it rushes past an opening connected to the vessel to be exhausted. The stream of mercury vapour drags the molecules of air along with it and the air passes into a vessel previously exhausted to a pressure of the order of 10^{-3} mm. of mercury, while the mercury vapour is condensed by a stream of cold water circulating round the upper part of the tube. These pumps are widely used to-day for such purposes as exhausting wireless valves.

Consult Barracough and Holmyard, *Mechanics for Beginners*, 1931; Bloch, *Kinetic Theory of Gases*, 1924.

Vacuum Cleaners, a type of air suction pump used for extracting dust from furnishings, etc. The first V.C.s., which were invented at the beginning of the present century, were operated by hand. They were essentially an arrangement of double bellows, each compartment of which communicated through a valve with the nozzle of the cleaner. By moving a handle in one direction the air was forced out of one compartment through a side-valve, while air laden with dust was drawn into the second compartment *via* the nozzle. The return stroke of the handle then exhausted the latter compartment and drew air and dust into the first compartment. The modern type of domestic V.C. is electrically driven by means of a high-speed motor. The nozzle communicates with a bag which collects the dust and filters the dust-laden air on its way out into the atmosphere. The fan that produces the suction is mounted in the communicating pipe and is driven by means of a belt from the armature of the motor. There are two popular types of this V.C.; one operates by means of air suction alone which extracts the embedded dust from the furnishings, while the second type has a revolving brush which is driven from the motor. This brush beats the carpet and sweeps surface dirt in the form of hair, etc., into the nozzle, where it is drawn into the dust bag. The cost of running these cleaners is very small, since they require only $\frac{1}{2}$ unit of electricity per hr. Central installations are often fitted in large buildings and hotels whereby a single suction plant is put into communication with a pipe and nozzle attachment in any room.

Vacuum Engines are small engines capable of generating power varying from one-fifteenth to one-half of a horse-power. The principle which underlies their working is the creating of a partial vacuum in the cylinder containing the piston, and thus allowing the atmospheric pressure to give

the necessary impulse to the piston. The partial vacuum is commonly produced by means of a flame which is drawn into the cylinder during the outward stroke of the piston. The flame heats the gases inside the cylinder, some of the gas necessarily escaping through a suitable valve. By suitable valve arrangements the flame burns out before the return stroke of the piston. The cylinder is water-jacketed and thus the hot gases in the cylinder are cooled. This effect is a partial vacuum, and the atmospheric pressure which acts on the exposed part of the piston pushes it into the cylinder. This operation and impulse are repeated for each revolution of the engine, which is far more complicated in its mechanism than might be inferred from this sketch. For further details a text-book should be consulted.

Vacuum Tubes. Air and other gases are very good insulators at ordinary pressures, so much so that it requires a potential difference of no less than 40,000 volts to cause a spark to jump across a gap between two pointed terminals like those of an induction coil. At lower pressures gases are not nearly such good insulators and the complex phenomena exhibited by the discharge of electricity through rarefied gases may be observed by connecting the electrodes of a tube, such as is shown in Fig. 1, to the secondary terminals of an induction coil, while the gas is gradually exhausted by means of a high-vacuum pump. The coloration of the discharge depends on the nature of the gas in the tube, but the character of the discharge is the same for all gases. When the enclosed gas is air, a pink glow appears near the electrodes, while there is a dark space, known as *Crookes' dark space*, near the negative electrode. As the pressure is reduced a pink column of luminous gas, known as the *positive column*, appears, extending from the positive electrode for a considerable distance. This ends abruptly at a definite distance from the negative electrode or *cathode*, leaving a dark space, known as the *Faraday dark space*, between the positive column and the cathode. A short violet column, known as the negative glow, appears in front of the cathode, from which it is separated by the *Crookes' dark space*, while a red glow surrounds the cathode. The length of the Faraday dark space is constant for a given pressure and current inside the tube. As the rarefaction continues, the positive column breaks up into striations which are concave towards the *anode*; the *Crookes' dark space* and the negative

glow now begin to expand and the positive column is pushed backwards towards the anode, until at last the luminous glows disappear and the Crookes' dark space fills the tube. While the walls of the tube begin to phosphoresce with a pale green light. The discharge now takes place only if the potential difference between the electrodes is considerably higher than during the preliminary stages of exhaustion, for the pressure is of the order of 10^{-3} mm., and a discharge will not take place in a vacuum. It was experiments on the discharge of electricity through so-called vacuum tubes that led to the discovery of the electron and X-rays. X-rays are emitted from the anode when the stage is reached at which the Crookes dark space fills the tube. The best conditions for the emission of X-rays and the properties of these

magnetic field. He came to the conclusion that the cathode rays consisted of negatively charged particles whose mass was $\frac{1}{1837}$ of the lightest atom known, the hydrogen atom. This was the first evidence of the existence of a sub-atomic particle. It was followed by the remarkable discovery that the particles were identical whatever gas was enclosed in the tube. The name *electrons* was given to these sub-atomic particles; the electric charge they carry was measured by Thomson, Townsend, and C. T. R. Wilson, but in 1908 Millikan determined the charge correct to 1 part in 500; the value he obtained was 4.77×10^{-10} electrostatic units.

Canal Rays or *Kanalstrahlen* were first observed by Goldstein experimenting with a vacuum tube with a perforated cathode. They travel in

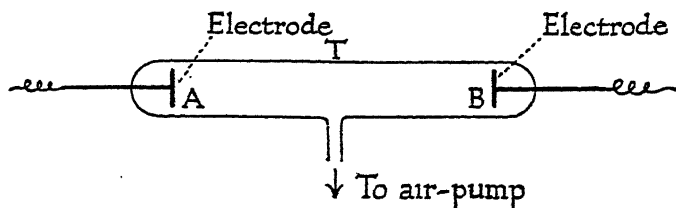


FIG. 1

rays are described in the article on X-rays. We shall confine our attention to the nature of the discharge before the last stage is reached. The first investigators in the field were Varley, Crookes, and Hittorf who discovered that a narrow beam of rays left the cathode and impinged on the anode. These rays, known as *cathode rays*, were found to be deflected by a magnet brought near to the tube, and in 1871 Varley came to the conclusion that the rays consisted of negatively charged particles travelling with great velocities towards the anode. The green phosphorescence, previously noticed, was shown to be caused by the impact of the cathode rays on the glass walls, for Crookes, mounting a metal sheet in the form of a Maltese cross in front of the anode, showed that a perfect shadow was cast on the back of the tube. Evidently the cathode rays travelled in straight lines and were obstructed by the metal cross. Lenard, however, showed that these rays could pass through a thin metal foil window placed in the walls of the tube. In 1897 J. J. Thomson measured the deflections of the cathode rays produced by an electric field and a

straight lines through the cathode and cause substances to phosphoresce. Their nature was discovered by J. J. Thomson by measuring their deflections in electric and magnetic fields. He found that they consisted of positively charged particles; that their masses and velocities depended on the nature of the gas in the tube. They are, in point of fact, positive ions, i.e. atoms deprived of one or more electrons. Later work on positive rays led Aston to the discovery of isotopes (*q.v.*).

Geissler Tubes.—A Geissler tube is a vacuum-tube containing a gas at a pressure of the order of a millimetre of mercury. At this pressure the capillary tube is filled with the positive column of luminous gas. These tubes, invented by Geissler and perfected by Geissler, were first used for spectroscopic work on gases (*see SPECTRUM*). Their commercial value has been realised since the War and they are extensively used as advertising signs. The familiar orange-red Geissler tubes used for this purpose contain the rare gas neon, while tubes containing mercury vapour and neon with a trace of mercury vapour are fairly common.

A pressure of about 15,000 volts is generally used for these signs. The fact that the orange light from neon tubes penetrates fog exceedingly well has led to the adoption of neon beacons at aerodromes and light-houses such as the Columbus memorial now in course of construction.

Consult Millikan, *The Electron*; Starling, *Electricity and Magnetism*; Pidduck, *A Treatise on Electricity*; Baly, *Spectroscopy*; Aston, *Isotopes*. See also ELECTRON; CATHODE RAYS.

Vagabond, see VAGRANTS.

Vagrants. Under the comprehensive term V., Eng. law includes a vast number of petty offenders or persons suspected of contemplating the commission of some offence, there being practically nothing in the shape of a common factor underlying the various types of V. The whole law is still to be found in the Vagrancy Act, 1824, and the different amending Acts. Under these Acts, V. are classified into: (1) idle and disorderly persons, (2) rogues and vagabonds, and (3) incorrigible rogues. The first category comprises, *inter alia*, persons who fraudulently apply for poor relief; prostitutes behaving indecently in places of public resort; pedlar trading without a licence; persons loafing about any public place to beg alms, or causing or encouraging any child to do so; persons returning to and becoming chargeable to any parish from which they have been legally removed, etc. The punishment of idle and disorderly persons is imprisonment for a term not exceeding fourteen days with hard labour, or, if committed by two justices, one month, or as an alternative a fine not exceeding £5. In the class of rogues and vagabonds are included persons convicted for a second time of an offence which if it had been the first occasion would have constituted them idle and disorderly persons; fortune tellers; persons wandering about and lodging in out-houses or other deserted buildings, or in the open air, without visible means of subsistence and without giving a good account of themselves; persons exposing to view in any shop, road, or public place, any obscene print or picture; persons obscenely and wilfully exposing their persons in a public place; persons who endeavour by the exposure of wounds or deformities to obtain alms; persons running away and leaving a wife or child chargeable to a parish; persons gaming in a public place (including a railway carriage); male persons living on the earnings of prostitutes (Vagrancy Act, 1895); persons who persistently solicit in any public place for immoral purposes; persons armed with offensive weapons with intent

to commit felony; reputed thieves or suspects frequenting any river, canal, wharf, street or highway with intent to commit a felony; and persons committing offences under the Aliens Act, 1905. The punishment of rogues and vagabonds is either fourteen days' imprisonment with hard labour or three months' imprisonment, according to whether the conviction is before one or two justices, or a fine of £25. The class of incorrigible rogues includes persons convicted a second time as rogues and vagabonds, and V. breaking out of legal confinement. The punishment may extend to one year's imprisonment to which whipping (in the case of males) may be added. Offenders included in classes (1) and (2) may appeal to Quarter Sessions. Offenders of class (3) may appeal from Quarter Sessions to the Court of Criminal Appeal. See C. J. R. Turner, *Vagrants and Vagrancy*, 1887; W. H. Dawson, *The Vagrancy Problem*, 1910; M. Higgs, *Down and Out*, 1924.

Vaillant, Edouard-Marie (1840-1915), one of the founders of Fr. Socialism; b. Jan. 26, at Vierzon (Cher). Doctor of science, Paris, 1865. Also a surgeon. In 1870, returning from Lausanne, joined National Guard. In Commune, 1871, Minister of Instruction. At Congress of the International, London, same year. Condemned to death by war council at Versailles, 1872. Amnestied, 1880; became editor of *L'Homme Libre*, 1888. Deputy (Paris) from 1893. Strong for Allies, 1914. Died in Paris, Dec. 18.

Vaishnavas, a sect of the Hindu religion, distinguished from the others by the special worship of Vishnu, who, they hold, is supreme over the other gods of the Trimurti.

Valais (Ger. *Wallis*), a canton of Switzerland, stretching from Mt. Jura to the Col de Balme. The canton is trilingual; French, German, and Italian being spoken by the inhabitants. It is one of the most picturesque cantons of Switzerland.

Valdemar, see WALDEMAR.

Valdenses, see WALDENSES.

Valdepeñas, a tn. of Spain in the prov. of Ciudad Real, noted for its red wines. Pop. 34,630.

Valdes, Armando Palacio, see PALACIO VALDES, ARMANDO.

Valdes, Juan de (c. 1500-44), a Spanish reformer, b. at Cuenca. His brother being imperial secretary of state, he obtained the post of secretary to Charles V. of Germany, and afterwards acted in the same capacity to the viceroy in Naples. While there he attempted to bring about the regeneration of the church, but

though not a Lutheran and not opposed to Catholic doctrine, he was hated by the Romanists. He wrote *Spiritual Milk*; *The Christian Alphabet*; and commentaries on the N.T.

Val de Travers, a valley of Switzerland in the Jura Alps, 13 m. S.W. of Neuchâtel. The well-known asphalt is named after it.

Valdivia, the southernmost prov. of the republic of Chile. It has an area of 10,146 sq. m., and is richly stocked with forests, the export of various kinds of timber being one of the principal industries. Means of communication are not good. The cap., V., a commercial port on the R. V., was founded in 1551 by Pedro Valdivia, the conqueror of Chile. Pop. prov. (1929) 216,524; tn. 26,854.

Valdosta, a city of Georgia, U.S.A., on the Atlantic coast. It is the port for the local cotton and fruit trade. Pop. (1930) 13,432.

Valence, a tn. of France, cap. of the dept. of Drôme, in a fertile plain, on the l. b. of the Rhone. It has a fine old cathedral, and manufs. of silk, cotton goods, gloves, leather, etc. Pop. (1926) 30,964.

Valencia: (1) A maritime prov. and former kingdom of E. Spain. The surface is low and level along the coast, but rugged in the interior. The soil is rich, and rice, wine, oil, and mulberries are produced. Silk culture is carried on, and coal is found. Area 4150 sq. m. Pop. (1928 est.) 997,215. Its cap. is Valencia, on the Guadalaviar, 3 m. above its mouth. V. is an anct. city, which has undergone extensive alterations. Its flourishing university was founded in 1410. There are manufs. of silks, velvets, linens, tobacco, leather goods, glazed pottery, and bricks, etc. Pop. (1928 est.) 269,727. (2) A tn. of Venezuela, 80 m. W.S.W. of Caraccas, W. of Lake V. It is the cap. of the state of Carabobo. Here are two cotton mills. Pop. (1926) 36,804. (3) See **VALENTIA**.

Valencia de Alcantara, a tn. in the prov. of Caceres, Spain, in the middle of a farming dist. It is a considerable customs centre. Pop. 12,500.

Valenciennes (Lat. *Valentianae*), a tn. in the N. of France, in the dept. of Nord. V. is a fortified city of the first class, with several fine churches and a Jesuit college dating from the seventeenth century. It is celebrated as the birth-place of Froissart and Watteau. Trade is mostly in coal, sugar, chicory, chemicals, etc. The lace to which it gives its name is no longer made here. V. was occupied by the Gers. during the Great War, and was taken by the Canadians in 1918. Pop. (1926) 40,023.

Valency. When chlorine combines

with hydrogen, one atom of chlorine combines with one atom of hydrogen. Two atoms of hydrogen combine with one of oxygen and for combination with nitrogen and carbon three and four atoms of hydrogen are required respectively. One atom of chlorine never combines with more than one atom of hydrogen, and it is satisfied or saturated by the union with one atom. The atom of oxygen requires two atoms of hydrogen to be saturated, nitrogen three, and carbon four atoms. In its simplest form, the V. of an element is the number of atoms of hydrogen, or of any other standard univalent element (or radical such as CH_3), capable of uniting with one atom of the element. The elements themselves are termed *uni-, di-, tri-, and tetra-valent*, according to the number of univalent atoms with which they can unite. Measured by their combining capacity, elements do not always exhibit the same V. Thus one atom of phosphorus is satisfied with three atoms of hydrogen, but can combine with five atoms of chlorine. The V. of an element is therefore often a variable quantity, and, in many cases, dependent upon temperature and pressure. Thus if the compound PH_3 (phosphine) be mixed with hydrochloric acid (HCl) and the mixture subjected to pressure, a crystalline compound, phosphonium chloride (PH_4Cl), is formed in which the phosphorus atom is pentavalent. Where, in a compound, an atom is not functioning in its highest recognised V., there is a tendency for the compound to unite with additional atoms to form new compounds. Thus carbon monoxide (CO), in which the carbon (a tetrad) is apparently functioning as a divalent element, unites with an atom of oxygen to form carbon dioxide (CO_2), where carbon functions as a tetrad. In some cases, molecules of different compounds, in which all the atoms are fully satisfied, unite to form other compounds. Thus hydrogen fluoride and potassium fluoride combine to form the compound hydrogen-potassium-fluoride ($\text{HF} + \text{KF} = \text{KHF}_2$). In simple cases, the relation

$$V. = \frac{\text{Atomic Weight}}{\text{Equivalent Weight}}$$

holds good. But it is now realised that there is no hard and fast definition of V. Werner's Theory (*q.r.*) has been especially fruitful in predicting new types of compounds. The Electronic Theory of V. (see Sidgwick, *Electronic Theory of Valency*) appears to be firmly established. There seem to be two kinds of V. linkage

between atoms: (1) polar linkages; binding together atoms electrically opposite in character, e.g. in NaCl; (2) non-polar links as in most organic compounds, e.g. CCl₄. The existence of such bodies as CoCl₂(NH₃)₆ is explained by co-ordinate linkages. The whole question of V. is closely bound up with that of the structure of the atom. Consult Holmyard, *Inorganic Chemistry*. See CHEMISTRY.

Valens, Flavius, was emperor of the East (A.D. 364-378). He was the brother of Valentinian I., and was b. about 328. His reign marks the decline of the Rom. power, for during it the Goths were admitted into the countries S. of the Danube. It was also characterised by the contests between the Catholics and Arians.

Valentia, or **Valencia**, a small is. off the S.W. coast of Ireland, where there are several cable and signalling stations, and a small harbour. V. is important as a meteorological centre.

Valentine, Saint, a priest and martyr of Rome who suffered death probably during the persecution under Claudius II. in 270. St. Valentine's festival falls on Feb. 14, and the name is very popular in England; but notwithstanding this, apparently no church has been dedicated to him. The custom of sending valentines probably had its origin in a heathen practice connected with the worship of Juno; its association with the saint is wholly accidental.

Valentine and Orson, known to mediæval romance as the sons of the Emperor of Greece, fortuitously connected with the Charlemagne romances. Their story is of folk-lore origin, being based on the common folk-lore legend of a man reared by a bear (Orson = *Ours*son = bear's son). Versions exist in many languages. A chap-book dealing with them was published in Glasgow as late as 1850.

Valentinian, the name of three Rom. emperors: **Valentinian I.**, **Flavius** (A.D. 364-375). The frontiers of the empire were exposed to great danger during his reign. Through his general Jovinus, he gained a victory over the Alemanni in A.D. 366. In A.D. 368 the Alemanni renewed their attacks upon Eastern Gaul, but V. drove them back. This emperor was a man of ability and a wise administrator. **Valentinian II.**, **Flavius** (A.D. 375-392), son of Valentinian I. He was at first an Arian, but later abandoned this heresy. **Valentinian III.**, **Placidius** (c. A.D. 419-455), son of Constantius. During his reign Numidia was taken by Genserik, king of the Vandals.

Valentinus, one of the most famous of the Christian Gnostics, was a native of Egypt. He was educated at Alex-

andria, but went to Rome about A. 140, and remained there through the times of Pius to the episcopate of Anicetus. He found many adherents (*Valentinians*), especially in the East, and persevered in propagating his doctrines, notwithstanding the censures of the church. His system recognised a series of forms of manifestation of the hidden being of God, the Demiurgus or dependent divinity, and the Soter, or Redeemer, whom he regarded as being united with the personal being of Jesus Christ. In addition to this he names the prime Essence the Bythos. See bibliography under GNOSTICISM.

Valera, Eamón de, see DE VALER. **Valera y Alcalá-Galiano**, Juan (1821-1905), a Spanish politician and writer. He entered upon a diplomatic career (1847), serving at Naples, Lisbon, St. Petersburg, and elsewhere. Returning to Madrid (1858), he contributed largely to Albarada's Liberal opposition journal, *El Contemporáneo* (1858). He held various high posts later, becoming Director of Public Instruction (1868), ambassador to Lisbon (1881-83), Washington (1885), and Vienna (1893-95). His most famous works are his novels, including *Pepita Jemenez*, 1874; *Las Ilusiones del Doctor Faustino*, 1875; *Doña Lu*, 1879. V. also wrote short tales: *El pajar verde*, the *Parsonades*; poetry and critical works, such as *Disertaciones y juicios literarios*, 1883; *Estudios críticos* (2nd ed., 1884); *Ecos argentinos*, 1901. See Brunetière on 'Juan Valera' in *Hist. Littérature*, I., 1884.

Valerian, or **Publius Licinius Valerianus**, Rom. emperor A.D. 253-6, a Rom. general and faithful supporter of Gallus, after whose death he was elected emperor by the soldier V. took his son Gallienus as colleague and, leaving him in charge of affairs in Europe, himself set out for the East to crush the Persian Sapor I. (257). After some success he was entrapped by Sapor and imprisoned till his death. See Pollio's *Life of Valerian* and Aurelius Victor's *Cæsares*.

Valerian (Valeriana), a genus of plants and shrubs with cymes of pink or white flowers. *V. mikanii* (c. *officinalis*), the great wild V., is a plant with pinnate leaves. The root is highly attractive to cats, and is used medicinally.

Valeric or Valerianic Acid (C₈H₈COOH), the name given to the mixture of acids obtained by distilling the macerated plants valerian or angelica with water. It is an oily liquid with a unpleasant smell (boiling point, 174°C.). There are four isomers with the molecular formula, of which isovaleric or isopropylacetic acid and opt

cally active valeric or methylethylacetic acid are the most important.

Valerius Flaccus, *see* FLACCUS.

Valerius Maximus, a Rom. historian of Tiberius's reign; a friend of Sextus Pompeius, whom he accompanied to the East (A.D. 27). His *Factorum et Dictorum Memorabilium Libri IX.* is interesting as a specimen of the transition from classical to 'silver' Latin. There are editions by Halm (1865), Kempf (2nd ed. 1888), Smith (selections with Eng. notes, 1895). *See* Vossius, *De Historicis Latinis*; Speed's Eng. trans. (1678).

Valéry, Paul, one of the leading figures in modern Fr. literature, was b. in Cette, Oct. 30, 1871, of a Fr. father and an Italian mother. Educated at Montpellier, he then studied law. In Paris he became one of the familiars of Stéphane Mallarmé, the symbolist. V. proved himself an apt pupil. Some of his prose and verse pieces appeared in magazines of no very wide circulation, which appealed to a small coterie. He was famous among the intellectuals, unknown to the wider public. For three years, from 1897 to 1900, he worked in the artillery bureau of the Department of War. Then for seventeen years he studied mathematics and philosophy and worked out a scheme of what he called pure poetry in which the music was far more important than the meaning. In 1917, upon the demand of some great Fr. literary men, he collected the verses he had written and they were pub. under the title *La Jeune Parque*. There followed *Le Cimetière Marin* and *Album de vers anciens* in 1920, his prose work, *La Soirée avec M. Teste*, also in 1920, and *Le Serpent*, in verse, 1921. Then came the greatest beating of literary drums known in France for decades. V. was famous. In 1925 he was elected member of the Fr. Academy. It was the mode to read him, but few understood him. His books were restricted in content and printed mainly in limited editions. They were hard to procure. They fetched fancy prices. It is only lately that in *Charmes* (containing most of his poetry) and *Variété* and *Eupalinos*, containing most of his prose, that he has been accessible to the general public. Many of his poems are cryptic, but there is no denying the presence of some lovely lines. Critics and eulogists have written far more about him than he has written himself, and the curious fact, too, is that those who try to explain his obscurity become obscure themselves. But in France every new piece by him is hailed as an event of first-class importance. *Le Serpent* has been

translated into Eng. by M. Wardle (1924); also the *Introduction to the Method of Leonardo da Vinci* by T. McGreevy (1929), and *Variety* by Malcolm Cowley (New York, 1927).

Valetta, Valletta, or La Valetta, the cap. and seaport of Malta, on the N.E. coast, headquarters of the British fleet in the Mediterranean and an important coaling station. Its strong fortifications were partly built by the Knights of St. John after 1530; the city being founded, 1566, between Great and Quarantine ports. It became a British possession in 1801. An important port of call on the Suez route to the E.. V. has considerable transit trade, and manufs. silk. Pop. (1931) 22,779.

Valette, Jean Parisot de la (1494-1568), grand master of the Knights of St. John of Jerusalem at Malta (1557), and founder of Valetta (1566). He was noted for his successes against the Turks, particularly for his defence of Malta against the Sultan Solymán (1565). *See* Mermet, *Eloge*, 1803; Pfaff, *Philippe Villiers et J. de la Valette*, 1851; De Thon, *Hist. sui Temporis*; Vertot, *Hist. des Chevaliers de Malte*.

Valhalla, or Walhalla, in old Norse or Scandinavian mythology, the abode of Odin in Asgard. Originally the realm of the dead, it came to be regarded in the Viking age as the home of departed warriors, who spent their days fighting and feasting. *See* the Gk. ELYSIUM.

Valkyries, Valkyrs, or Walküre, in Scandinavian mythology, Odin's band of beautiful handmaidens, generally said to be nine in number. After every battle they were sent forth to choose which of the slain should be conducted to Valhalla. They also served at the banquets there. Odin's daughter, Brunnhild, is one of them. For her story *see* Wagner's 'Die Walküre,' from *Der Ring des Nibelungen*.

Valla, Lorenzo, or Laurentius (c. 1407-57), an eminent classical scholar and controversial writer, said to have been saved from the Inquisition by his patron, King Alfonso V., who contrived his escape to Rome, where he became secretary to Pope Nicholas V. He taught successively at Pavia, Milan, and Naples; and was the author of *Annotationes in Novum Testamentum*, *De Elegantia Latine Linguae*, and Latin translations of Herodotus and Thucydides. *See* J. A. Symonds, *Renaissance in Italy*, 1897-99; Mancini's *Vita* (Florence), 1891.

Valladolid: (1) A prov. of Old Castile, Spain, 2922 sq. m. in area, including part of the Douro valley. It is largely agricultural, and is called

'granary of the Peninsula.' Fruits, wines, oil, madder, timber, honey, and wax are produced. Pop. (1928 est.) 285,690. (2) Cap. of above, and formerly of all Spain, at the confluence of the Pisuerga and the Esgueva. Among its chief buildings are the cathedral (1535), mun. offices, museum, and university (1346). Destroyed by fire (1561), the city was rebuilt under Philip II., who was b. here. Columbus d. here (1506), and the house occupied by Cervantes (1603-06) is owned by the state. The Northern Railway has works at V. Pop. (1928 est.) 73,819. (3) A tn. of Yucatan, Mexico, 90 m. S.E. of Merida. Its cathedral and Franciscan convent were destroyed by Indians (1848). It has a fine aqueduct and cotton manufs. Pop. 4750.

Valle, Pietro della, surnamed Il Pellagrino (1586-1652), an Italian traveller in the East, who set out as a pilgrim for Palestine and the adjacent countries (1614). He also visited Persia (1617), finally returning to Rome (1626). His *Travels in India and Persia* were pub. in 1658-63, and translated into Eng. in 1665. See Bellori's *Vita*, 1622.

Valle-Inclán, Ramon Maria del, one of the leading names in modern Spanish literature, was b. in Galicia in 1869. As Galicia is a sort of Spanish Brittany, he brought to his country's literature something of the true Gallegan flavour. He first attracted attention by his book of poems *Aromas de Leyenda*, 1906, in which he sang the life of the common people. There were in the poems an earthy strain redolent of the soil and at the same time an exquisite refinement more like that of the Fr. decadents. He followed this book up with one of the most delightfully fanciful things in modern Spanish literature—*Marquesa Rosalinda*. This poetic comedy, also, is more typical of Fr. than of Spanish literature. He has written many other books of verse and prose, but the most celebrated prose piece is his four *Sonatas*, one for each season of the year and dealing with episodes in the career of his hero Xavier de Bradomin, who is Valle-Inclán's conception of Don Juan.

Vallejo, a city of Solano co., California, U.S.A., on San Pablo Bay (N.E.), 30 m. N.E. of San Francisco. It has shipyards and iron foundries; while Mare Is. opposite is the headquarters of the U.S. Pacific Naval Squadron, with a navy yard, arsenal, dry docks, and a lighthouse. Pop. (1930) 14,476.

Valley. Just as mountain ranges and masses result from the great uplifts of the earth's crust by weathering,

so great depressions exist between such uplifts. They are usually, however, too extensive to be noted except in maps; when they are sufficiently small to be a prominent feature, they are *synclinal* Vs. Where, too, the region between two more or less parallel faults has gradually subsided, *rift* Vs. are formed. The Forth-Clyde estuaries in Scotland, the Ghor or Jordan V. are examples. *Submerged rift* Vs. are occupied by the Adriatic and Red Seas, many lakes being also formed in this way. Where the broken upturned strata of the earth's crust form ranges of mountains (*q.v.*), *longitudinal* Vs. are formed by the more rapid denudation of the softer rocks. All these types are determined by geological changes resulting from crystal movement in the earth, the features being softened only by long-continued weathering. In dry climates they are most marked, and the great *inland drainage areas* of Australia, Central Asia, and N. America may be considered as huge Vs. of this kind. Surface geological features are generally completely marked by the incessant operation of radiant forces from the sun, and the consequent atmospheric changes; the surface of the earth is 'sculptured,' and most deeply by running water and moving ice. Land upraised from the sea would in general be slightly out of the horizontal, with very varied conditions of strata. It has often happened that surface streams, formed in the 'young' stage of the history of such land, flowed transversely in the strike. The eroding action of such streams is rapid enough to wear through the rocks quicker than the steady elevation, and weathering can leave them as barriers. River Vs. are thus formed across the strike, and are known as *transverse* Vs. When quite short they are known as *river-gaps*. In either case they are narrow and deep, forming ravines or gorges which depend for their other features on the intensity of weathering. They form very striking scenery in dry regions, particularly when the strata are horizontal. The cañons of Colorado are terraced erosion Vs. *River* Vs. have forms varying with the course and stage in the life-history of the eroding streams. The effort of erosion and weather alone has a powerful effect in forming the shape of the river Vs. Curves depend on the nature of the soil through which the riv. meanders; the floor of the riv. beds also depends on the nature of the soil—glacial action having the effect of widening the bottom, while the deposition of alluvium builds up a raised floor. *Rias* and *fjords* are submerged or *drowned* Vs. *Handing* Vs.

are formed by tributary streams of less eroding power than the stream responsible for the main V.; they enter its sides at a level above the banks of the main stream. Rivs. flowing from regions of good precipitation and flowing through drier regions exhibit these Vs. *Solution* Vs.: many depressions are considered to be due to the gradual removal of underground material by solution due to ground water with a definite direction of seepage, or to the more defined underground streams. *Glaciated* Vs. occur in high mountains and regions of perpetual snow; they are carved by the moving ice streams, and differ from riv. Vs. in having a U-section, with steeper banks, usually rocky and precipitous. Ancient Vs. of this type, but weathered out of typical form, are found in N. America and Europe as relics of the glacial age; they often contain moraine-dammed lakes. Vs. are natural communications and highways, and, when extensive, the homes of civilisation. Egypt was the lower Nile valley and delta. Mesopotamia and the Tigris and Euphrates Vs. gave rise to three typical communities, Chaldea, Babylonia, and Assyria. The first, in the lowest part of the valley, was typically agricultural; the second, in the middle region, had broader and more vigorous pursuits, including both agriculture and pasture; the last was more truly pastoral, of narrower pursuits but hardy. The influence of the home is in each case reflected in the civilisation of the community, and the same stages are marked in most Vs. See the bibliography under MOUNTAINS and RIVERS.

Valleyfield, a manufacturing city of Quebec, Canada, in Beauharnois co., on the R. St. Lawrence, at the upper end of Beauharnois Canal. There are cotton, woollen, flour, and saw mills, etc. Pop. (1926) 9215.

Valley of Ten Thousand Smokes, a volcanic valley in the Katmai dist. of Alaska. Mount Katmai blew up on June 6, 1912, causing total darkness for three days, and depositing ten in. depth of ash one hundred m. away. Shortly before the eruption, the valley burst in many places and threw out masses of molten material. These fissures have continued to discharge hot gases, and it is from this peculiarity that the valley has received its name. President Wilson proclaimed the dist. a National Monument in 1918. See R. F. Griggs, *The Valley of Ten Thousand Smokes*, 1922.

Vallombrosa, a Benedictine convent in Vallombrosa Valley, 16 m. E. of Florence, Italy, founded by St. John Gualbert (c. 1038). The present build-

ing dates from 1637. The abbey was suppressed and became a school of forestry after 1869. It is mentioned in Ariosto's *Orlando Furioso* and Milton's *Paradise Lost*.

Valmy, a vil. of Marne dept., France, 6 m. from Ste. Menchould. A pyramid (1819) on a hill in the S. commemorates the victory of the Fr. Revolutionists under Kellermann and Dumouriez over the Prussians (1792). Pop. 500.

Valois, Adrien de (Adrianus Valesius) (1607-92), younger brother of Henri de Valois. In 1646-58 he published his great historical work of France, under the title *Gesta Francorum, seu de Rebus Francicis*. This work comprises the history of France from A.D. 254 to 752.

Valois, Charles de, see ANGOULÊME, CHARLES DE VALOIS, DUKE OF.

Valois, House of, a Fr. dynasty, ruling 1328-1498 and beginning with Philip VI. (1328-50). Next came John (1350-64) and Charles V. (1364-80), under whom France suffered severely in the war with England. She was defeated at Crécy and Poitiers (1346 and 1356), and John was taken prisoner to London. The state was reduced to bankruptcy, the nobility grew rebellious, the people almost barbarous. Charles VI. (1380-1422) was defeated by Henry V. at Agincourt (1415). France was saved by Joan of Arc, who had Charles VII. (1422-61) crowned at Rheims. He instituted a special tax for a regular army. His successor, Louis XI. (1461-83), kept down the nobles; and recovered Maine, Anjou, and Provence, and part of Burgundy. Charles VIII. (1483-98) secured Brittany by his marriage with Anne of Brittany. He had no son, and the crown passed to Louis of Orleans (XII.), the first of the Valois-Orleans house.

Valparaiso: (1) A city of Chile, S. America, and a seaport on the Pacific. There are steamship services to Europe and the U.S.A.; whilst breweries, foundries, and machinery and railway workshops, etc., account for its busy industrial life. Copper, nitrate, silver, and wheat are exported. It has frequently suffered from earthquakes. Formerly dirty and unprepossessing, both the city and its harbour have undergone great improvement. It is the chief commercial centre on the W. coast of S. America. Pop. (1924) 187,039. (2) A university tn. and the co. seat of Porter co., in Indiana, U.S.A. It lies 38 m. S.E. of Chicago. Pop. (1930) 8079.

Vals-les-Bains, a vil. and spa in the canton of Aubenas, France. Its waters have similar properties to those of Vichy. Pop. 2800.

Valtellina, the valley of the Upper Adda, prov. of Sondrio, N. Italy. It is generally held to include the Liro or San Giacomo Valley, and extends to Lake Como (44 m.).

Valuation, see APPRAISEMENT, DOMESDAY BOOK, TAXATION, RATING.

Value, in political economy, the quantity of labour, or of the product of labour which will exchange for a given quantity of labour, or of some other product thereof. *Utility* must be distinguished from *V.*, or, in Adam Smith's phraseology, *value in use* from *value in exchange*. Water, being indispensable to existence, has a very high degree of utility or of *V.* in use, but as it can generally be obtained in large quantities without much labour or exertion, it has but a low *V.* in exchange. Diamonds, on the other hand, which exist only in limited quantities and require extraordinary labour in production, are of comparatively little or no utility, but of enormous exchange *V.*

Valves are the two parts into which the pericarp of pods splits open along defined lines to liberate the seeds.

Valves. Mechanical contrivances for regulating the movement of fluids along pipes. The *flap V.* is one of the most common, worked by the pressure of the fluid itself. A special seating is provided in the pipe, and the flap is simply a hinged metal door opening and closing on this. It is faced with leather, rubber, or such other material as will make the closing fluid-tight. The double form is known as the *butterfly V.* In both cases a guard is attached to prevent excessive opening. This type is suitable only for low pressure and slow 'beat,' e.g. in the case of hand suction pumps. The *poppet*, or mushroom *V.*, is not hinged. Shaped like a mushroom, it rests with its flat base on the *V.* seating and its stem in the pipe; it lifts bodily from its seating, and some form of guide is arranged to ensure true working. The seating and the fitting end of the poppet are generally worked into conical form, which gives a better fit and some self-adjustment to wearing due to friction. In addition, three flanges are usually cast on the end fitting the orifice. An arrangement is provided to prevent too great a jump; this may be merely a metal guard, or rubber rings working against a fixture above, or a spring of adjusted power; in which two last cases the *V.* may be lighter, not closing by its own weight. Such *Vs.* are suitable for higher speeds and pressures which would rapidly throw a hinge out of action. There is, however, the difficulty of shock to be met, partly by reduction of weight of

moving parts, partly by reduction of the area of contact, and partly by reduction of the lift. By providing a double seating, as in the *double-beat V.*, half the lift only is required. *Four-beat Vs.* are used for powerful engines in extension of this principle. In the *Pulsometer* (see PUMPS) and other high-speed engines a ball is used as a *V.* For air pumps, *Vs.* of rubber are generally used. Stop *Vs.* for opening and closing a port at will are often operated by hand; in this case the *V.* is attached to a spindle which raises or lowers it by means of a screw thread, the *V.* not turning with the screw; it is practically a hand-operated poppet *V.* To avoid the evils of varying boiler pressure, reducing *Vs.* are employed. There are several kinds of reducing *Vs.*, but their modes of action are the same. The entering steam passes by the *V.* closed by a spring to the main throttle *V.*, which it lifts and then acts on the piston. The reducing *V.* has a flexible diaphragm which controls the motion of the main throttle *V.* and reduces leakage and sticking to a minimum. *Cocks* are a form of *V.* usually operated by hand; a seating is provided in the pipe into which a conical plug is inserted. Through this is drilled a hole which by the turning of the plug can be made to continue the passage of the pipe through the plug, or lie across the passage, and interrupt the flow of fluid. They are used in water pipes in houses, but are not suited for rapid working at great pressures, as the suddenness of action gives rise to too great shock.

Safety Valves are attached to boilers or other vessels where the fluid contents may reach a pressure great enough to cause bursting. The *dead-weight safety V.* has a spherical *V.* fixed to a cover piece which can be loaded with weights. These are adjusted so that the *V.*, the shape of which prevents sticking, will lift if pressure through the pipe becomes too great. There is good stability owing to the low centre of gravity. The *lever safety V.* has a conical *V.*, the pressure on which is adjustable by means of a weight acting at the end of a lever. The moment steam escapes, its lifting force varies in a manner differing with the shape of the *V.* and opening; usually the lift required to keep the passage open is greater than that required to open it, and it would be better if load diminished with opening. The use of springs intensifies this difficulty. In marine safety *Vs.* two or three are placed on the same *V.* box so as to produce more opening for the lift. Long springs are used and so adjusted that an opening of not more

than $\frac{1}{2}$ in. will be necessary, thus reducing the increased load. On locomotives springs are universal, the 'Ramsbottom' being very largely used. Both Vs. are operated simultaneously by the spring acting on the lever. The fulcrum by its position ensures the lessening of the load if the V. lifts. The extension of the lever provides a means whereby the engineer-driver may test either V. for sticking or obstruction. The 'Naylor' contrivance is largely used for spring safety Vs. The V. is pressed on its seat by means of a spring acting through a bent lever so arranged that the opening of the V. and pressure on the spring alter the leverage, thus not increasing the load. The *low-water safety V.* used on stationary engines is loaded directly by a spindle with a weight, but negatively by a weight acted on by a float through a lever. If water is too low the float increases in weight and reduces the load on the V. so that steam blows off. There are various ways of arranging that a V. shall not close until pressure is sufficiently relieved; one of the simplest is by shaping the periphery of the V. so that it forms a lip overhanging the orifice; the steam acting on this lengthens the period of lift. See E. L. Ahrons, *Steam Engine Valves and Valve Gears*, 1921; P. Youngson, *Slide Valves and Valve Gearing*, 1927.

Vambéry, Armin (1832-1913), a Hungarian Orientalist and traveller, b. at Duna-Szerdahely, on an island in the Danube. He became a schoolmaster; and acquired a wide knowledge of European, Turkish, and Arabic tongues. Between 1862 and 1864, disguised as a dervish, he penetrated to Khiva, Bokhara, and Samarkand. He visited London and Paris, and finally was appointed professor of Oriental languages at Budapest. He published: *Travels and Adventures in Central Asia*, 1865; *Wanderings and Adventures in Persia*, 1867; *Sketches of Central Asia*, 1868; an *Autobiography*, 1883 (9th ed. 1914); *Western Culture in Eastern Lands*, 1906; *Coming Struggle for India*, 1885; *Origin of the Magyars*, 1882; *The Turkish People*, 1885; *Hungary*, 1887.

Vampire, a monster which figures largely in the superstitions of Russia, Serbia, and Poland; and which, with modifications, darkens the folklore of many peoples. It is primarily the spirit of a dead man, which, leaving the grave by night, sucks the life-blood of sleepers till they waste away and die. Wizards, witches, suicides, and werewolves are especially prone to become Vs.

Vampire Bats, which are true blood-

suckers, are found in S. America, and belong to the genus *Desmodus* of the order *Chiroptera*. They are small creatures, and suck the blood of man, cattle, and horses. The bats which are found in the genus *Vampyrus* feed on fruit and insects, and have no share in the dietary of *Desmodus*.

Van, a tn. of Turkey in Asia on the eastern shore of Lake Van. V. has a considerable trade in corn and rice. The tn. is prosperous and has good cafés, schools, and bazaars. It is supposed to have been a place of residence of Semiramis. There are many antiquities and cuneiform inscriptions.

Vanadium, a metallic chemical element, symbol V, atomic weight 51.0, atomic number 23, found in the minerals vanadinite (lead vanadate), pucherite (bismuth vanadate) and mottramite (lead-copper vanadate). The element is prepared by heating the dichloride in a stream of pure hydrogen. It is a greyish metal with a high melting-point (about 1710° C.) and is used in making hard steels. V. forms five oxides, corresponding to the oxides of nitrogen; and three chlorides. The pentoxide, formed by burning the metal in air, gives rise to the vanadates. Many V. compounds find application in industry; thus the pentoxide is used as a catalyst in the manufacture of sulphuric acid, while ammonium vanadate is employed in dyeing leather, etc.

Vanadium Steel, see under IRON AND STEEL.

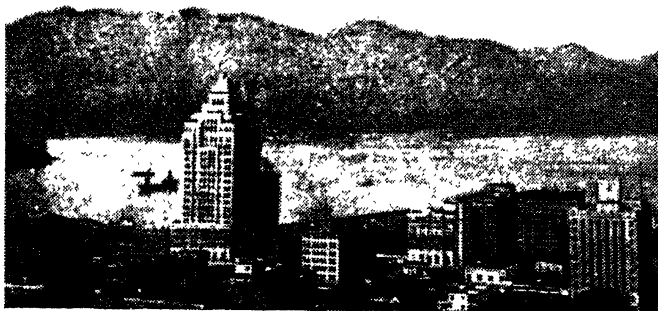
Van Beers, Jan (1821-88), a Belgian poet, taught Dutch language and literature in Malines, in Lierre, and from 1860 at the Athenæum in Antwerp. There is a warmth, simplicity, and vigour about his songs and ballads—*Jongelingsdroomen*, 1853; *Levensbeelden*, 1858; and *Rijzende Bladen*, 1883—which remind the reader of Longfellow.

Vanbrugh, Irene and Violet, Eng. actresses, are daughters of Prebendary R. H. Barnes of Exeter. *Irene V.* (b. 1872) began her stage career at the Theatre Royal, Margate, in the rôle of Phœbe in *As You Like It*. Among the numerous parts which she has played may be mentioned Rosalind in Barrie's play of that name; Nina in *His House in Order*; Rose Trelawny in *Trelawny of the Wells*; the Spirit of Culture in *Der Tag*; Cecilia Flinders in *The Man from Blankley's*; Agnes Ebb-smith in Pinero's *The Notorious Mrs. Ebb-smith*, and Paula in the same dramatist's *The Second Mrs. Tanqueray*. *Violet V.* (b. 1867) has also sustained a great number of rôles with high

distinction, among them being Edith Ogilvey in *The Letter of the Law*; Lady Tonbridge in *The Young Person in Pink*; Queen Katharine in an all-star revival of *Henry VIII.*, and Lady Carfax in *The Knave of Diamonds*. As comedy actresses the V. sisters had no superiors and held the London stage for years, their acting being instinct with charm and intensely true to life. Both married leading actors, Irene V. marrying Mr. Dion Boucicault, and Violet V., Arthur Boucher.

Vanbrugh, Sir John (1664-1726), an Eng. dramatist and architect, b. in London, was controller of the Board of Works from 1702. He designed Castle Howard (1701) and the Haymarket Theatre (1705), and drew

and the liberal extension of the franchise. He warmly supported the candidature of General Jackson for the presidency in 1823, and became successively governor of New York state, secretary of state, and vice-president of the Union, eventually succeeding Jackson as president in 1835. The early days of his presidency were mainly occupied in setting the national finances in order, a task in which he met with only partial success owing to the opposition of Congress. The country was upset by a financial panic and V. B. pressed his bill for an independent U.S. Treasury, which was finally adopted in 1840. He ran for the presidency in 1840 as a Democrat and in 1848 as Free Soil candidate.



A VIEW OF VANCOUVER

the designs for Blenheim Palace (1705). As early as 1696, his first play, *The Relapse*, was produced; and this was followed by many others, including *The Provoked Wife* (1697), *The False Friend* (1702), and *The Confederacy* (1705). His plays were witty, but marred by licentiousness. He was knighted in 1714. An edition of the *Complete Works* in 4 vols. was pub. in 1928, the dramas ed. by B. Dobrée and the letters by G. Webb.

Van Buren, Martin (1782-1862), an American statesman, b. at Kinderhook, New York, U.S.A., of Dutch descent. He devoted himself from early life to law and politics, and attached himself to the Democratic party, being elected to the U.S. Senate in 1821. He opposed the establishment of the state bank; supported war with England, and advocated the raising of the tariffs

Vancouver, situated on the mainland, is the chief city of British Columbia, and the chief Pacific seaport of Canada. It has a fine harbour, and steamships ply from V. to Japan, China, India; New Zealand and Australia; San Francisco and other N. and S. American Pacific ports. It is the terminus of the Canadian Pacific Railway. The city possesses an opera house, Carnegie library, several hospitals, and the University of British Columbia. It is a centre for the great lumber trade of the prov. Pop. (1930) 309,894.

Vancouver, George (1758-98), a British navigator, who accompanied Cook in his second (1772-74) and third (1776-80) voyages. In 1791-92 he was engaged in exploring the N.W. coast of N. America from 39° 27' N. to 52° 18' N., including the island which was named after him. A complete account of his voyage appeared

in 1798. See *Voyage of Discovery to the N. Pacific, and Round the World in the 'Discovery' and the 'Chatham' under Vancouver, 1790-95*, 4 vols., pub. 1798.

Vancouver Island, an island on the Pacific coast of N. America, separated from the mainland of British Columbia, of which it forms part, by Queen Charlotte Sound and Georgia Strait. Gold, iron, copper, and coal are found. There are about 100 m. of railway belonging to the Canadian Pacific Railway Company. Victoria (q.v.), the cap. of British Columbia, is situated on V. I.

Vandals, The, Teutonic people who, like their kinsmen, the Goths, suddenly appeared from the hinterland of N. Germany and helped to accelerate the downfall of the Rom. empire. In the days of Aurelian (271) there was a Vandal wing to the imperial army, and the famous Stilicho was Vandal by descent. Under Constantine I. (330) they made a home in Pannonia, many adopting the Arian Christianity which Ulfilas had taught. About 406 they began to swarm into Gaul; and their restlessness soon drove them across the Pyrenees to Spain, where, after much bloodshed, they settled down with the Alans in Andalusia ('Vandalitia'). At the rash bidding of Boniface, Count of Africa, they landed en masse (possibly 50,000) on African shores (429), and having possessed themselves of Hippo (431) and Carthage (439) were soon masters of the whole prov. Availing himself of the tumult consequent on the murders of Ætius and the Emperor Valentinian III., Gaiseric (or Genseric) (q.v.), the Vandal leader, appeared with his formidable array before the gates of Rome (455), and, having formally occupied that city, proceeded to carry out a systematic plunder before the very eyes of the helpless Romans. But retribution was soon to follow the remorseless persecutions of the Catholic Christians under Gaiseric and Hunneric, his son, the persistent ravages of Vandal pirates up and down the Mediterranean, and (above all, perhaps) that luxury, effeminacy, and sloth which had already undermined their pristine temperance and valour. In 534 King Gelimer, having suffered defeat at the hands of Justinian's general Belisarius, both at Ad Decimum and Tricamarum, finally acknowledged the supremacy of Rome, and thus brought to an abrupt conclusion the independent history of his tribe.

Vandamme, Dominique René (1770-1830), a Fr. general, b. at Cassel (dept. Nord). He entered the army in 1786, served under Napoleon

in the Rhine campaign (1795) and at Austerlitz. In 1813 he was compelled to surrender at Kulm, and was treated with great harshness during his imprisonment. He fought for Napoleon during 'the hundred days' and was exiled after Waterloo. See Du Casse, *Le Général Vandamme* (1870).

Vanderbilt, Cornelius (1794-1877), an American financier, b. at Stapleton, Staten Island. Descended from Dutch ancestors exiled by religious persecution. At sixteen bought a boat and started a ferry, which he gradually developed into a large steamboat business round New York. In 1863 started speculating in railways with great success. Left an immense fortune to his children. **W. H. Vanderbilt** (1821-55), his son, b. at New Brunswick. Commercially successful independently of his father; he helped later to organise some of his father's enterprises. Made large educational and charitable gifts during his life and by his will. **W. H. Vanderbilt** (1843-99), son of W. H. (*supra*); carried on his father's businesses, in which he was aided by **W. K. Vanderbilt** (b. 1849), his brother, who is the chief member of the family controlling the vast enterprises undertaken by the Vs., who are among the richest American millionaires.

Vanderbilt University, a non-sectarian institution of higher learning for men and women at Nashville, Tennessee, founded in 1873. It comprises a college of arts and sciences and schools of engineering, law, religion, medicine and nursing; and the average enrolment of students is about 1400.

Vanderdecken, see **FLYING DUTCHMAN**.

Van der Goes, Hugo, see **GOES, HUGO VAN DER**.

Van der Meer, Jan (the Elder, 1623-91), a Dutch landscape painter, b. in Haarlem. He was a pupil of Jacob de Wet, and excelled in his paintings of Holland. **Jan van der Meer** (the Younger, 1656-1705), a Dutch landscape painter, b. in Haarlem, son and pupil of the above.

Vandervelde, Emile, Belgian Socialist statesman; b. Jan. 25, 1866, at Ixelles. Studied law at Brussels and was called to the Bar in 1885. Is also a doctor of medicine. His chief energies, however, were devoted to the study of social questions, and in 1894 he was sent to represent Charleroi in the Chamber of Deputies. He especially devoted himself to the land question and to the furthering of co-operation amongst workers. Minister of state, 1914. During Ger. occupation, Minister of Intendence, civil and military, 1916-18. Minister:

of Justice, 1918-21; of Foreign Affairs, 1925-27. Publications include: *Le Collectivisme et l'Évolution Industrielle*, 1900; *La Belgique et le Congo*, 1911; *La Belgique envahie et le Socialisme International*, 1917; *Dans la Mêle*, 1919; *Faut-il changer notre Programme?* 1923; *Réalisations Socialistes*, 1923; *Les Balkans et la Paix*, 1925; *La Partie Ouvrière Belgique, 1855-1925*, 1925; *Le Marxisme a-t-il fait Faillite?* 1928.

Van der Waals, Johann Diderik (1837-1923), a Dutch scientist celebrated for his researches upon the kinetic theory of gases and upon the continuity of the gaseous and liquid states of matter. His equation $(P + \frac{a}{V^2})(V - b) = RT$ represents the actually observed relationship between the pressure, volume, and temperature of a gas much more closely than the simple law $PV = RT$. The constant b is, theoretically, equal to four times the real volume of the molecules of the gas, while a is proportional to the attraction that the molecules exert upon one another.

Van de Velde, the name of three Dutch painters: *Willem* the Elder (c. 1611-93) was appointed naval painter to Charles II. of England (1657). *Willem* the Younger (1633-1707), son of the above, whom he succeeded as marine painter to Charles II. (1679). *Adrian* (1639-72), animal and landscape painter, son of Willem van de Velde the Elder, was *b.* and *d.* at Amsterdam.

Van Diemen, Anthony (d. 1645), Dutch explorer and colonial governor, *b.* at Kullenberg. Went to India as a gov. accountant and, in 1625, became a member of the supreme council. In 1631 he returned to Holland in command of the Dutch Indian fleet, and, the following year, was sent back as director-general. Later he became governor-general, in which capacity he greatly extended Dutch interests in the Far East. In 1642 he sent Abel Tasman on a voyage to the S., the result of which was the discovery of the island which was named after him Van Diemen's Land, but which, at the instance of its British colonists, was changed to Tasmania.

Van Diemen's Gulf, between Coburg Peninsula and Cape Hotham and Melville Is., N.W. Australia. It is 100 m. long by 60 m. broad.

Van Diemen's Land, see TASMANIA.

Van Dyck, Sir Anthony (1599-1641), a Flemish painter, was *b.* in Antwerp, where in 1619 he opened a studio. His fame as a portrait-painter soon spread, and in the next year Lord Arundel invited him to come to

England, where he was employed by James I. He went to Italy in 1621, and after four years' wandering settled again in Antwerp, where he remained until 1632, when he came to London and was knighted by Charles I. Except for some months, he spent the remainder of his life in England. The king assigned V. D. a house in Blackfriars, and there he and the queen used to go from time to time to sit for their portraits, several of which were executed and are among the artist's masterpieces. He employed assistants, but always himself made the first sketch of each portrait, and gave each canvas its finishing touches. See W. H. Carpenter, *Pictorial Notices with a Memoir of V. D. and a Descriptive Catalogue of his Etchings*, 1844; L. Cust, *Van Dyck*, 1900; H. Stokes, *Sir Anthony Van Dyck*, 1905; E. V. Lucas, *Van Dyck*, 1926.

Vane, Sir Henry (the Elder, 1589-1655), an Eng. statesman, was knighted in 1611, and from the next year held various posts in the royal household. He entered parliament in 1614, and was employed on various missions and commissions. In 1640 he was made a secretary of state, but he was dismissed from this and his other offices in the following year for supporting the impeachment of Strafford. He then threw in his lot with the parliamentary leaders.

Vane, Sir Henry (the Younger, 1613-62), an Eng. statesman, the eldest son of Sir Henry V. the Elder. After spending two years in America, where he was governor of Massachusetts (1636-37), entered parliament in 1640, in which year he was knighted. In 1641 he was, for his share in the impeachment of Strafford, dismissed from the treasurer's office of the navy. He then joined the parliamentary party, and they appointed him to his old post, which he held until 1650. He took an active share in the negotiations with Scotland, and in 1648 was one of the commissioners who treated with Charles I. at Newport, but he refused to take part in the king's trial. In the early years of the Commonwealth he was one of the leading spirits; but in 1653 he quarrelled on a political matter with Cromwell, by whom three years later he was imprisoned for a pamphlet against the Protector's arbitrary methods. He took an active part in the restored Long Parliament (1659), but was early in 1660 expelled—his efforts as a peacemaker having turned all parties against him. After the Restoration, he was tried for high treason and executed on Tower Hill. There are biographies by John

Forster (1838), Hosier (1888), and Wellcock (1913).

Van Eyck, *see* EYCK.

Van Gogh, *see* GOGH, VINCENT VAN.

Vanilla, a genus of climbing orchids, natives of tropical Asia and America, with fleshy leaves and large white and yellow flowers. The V. of commerce is an aromatic used in the flavouring of confectionery and food. It is derived from the long dried pods of *V. planifolia*, which is extensively cultivated in tropical countries.

Vanini, Lucilio (1583-1619), an Italian freethinker, who wrote under the pseudonym of *Giulio Cesare*. Born at Taurisano, he studied at Naples and Padua and was inflamed with the 'New Learning.' He was ordained priest and led a wandering life, preaching a modern anti-religious philosophy, but was arrested (1618) on a charge of atheism, and after being cruelly tortured was burned at the stake. His writings include *Amphitheatrum Aeternae Providentiae Divino Magicum*, 1615; and *De Admirandis Naturae Arcanis*, 1616.

'Vanity Fair,' a political and social review, founded in 1868, and in its earliest years the foremost 'society' paper of the day. The series of pencil caricatures of men of public note by Pellegrini, and, later, the chromolithographic caricatures, especially of legal celebrities, by the inimitable 'Spy,' were outstanding features. In 1882 Thomas Bowles was editor and proprietor. Subsequent editors were O. A. Fry and Frank Harris. In 1928 the paper was incorporated in the Eng. edition of *Harper's Bazaar* and is now a fashion publication.

Van Lerberghe, Charles, one of the best modern Belgian poets writing in Fr. (1861-1907), was b. in Ghent, Oct. 21. He was educated at the celebrated College of Sainte Barbe in Ghent, where one of his fellow pupils and friends was Maurice Maeterlinck. Then he settled in Brussels to study for his degree as doctor of philosophy. He travelled widely, spending a long time in London and Germany and then in Italy. He had already begun to contribute verses to the leading Belgian periodicals representative of the new tendencies in Belgian Fr. poetry, and won a large measure of fame with his best book, *La Chanson d'Eve*. Bathed as his poems are in beauty, in fragile tenderness, they are, nevertheless, not for the many, because Van Lerberghe saw and sang mainly in symbols which are not always easy to understand.

Vanloo, the name of two Fr. artists: *Jean Baptiste* (1684-1745),

b. at Aix in Provence. He executed portraits of the Duke of Savoy, Colley Cibber, and Sir Robert Walpole, and became professor of painting in Paris (1735). *Charles André* (1703-65), his younger brother, was b. at Nice and studied at Rome. He was employed by the King of Sardinia, and became principal painter to the King of France. His 'Marriage of the Virgin' is in the Louvre.

Vannes, a seaport of W. France, cap. of the dept. of Morbihan in Brittany, with shipbuilding works and manufactures of woollens and ropes. Pop. (1926) 22,089.

Vannucci, *see* PERTUGINO.

Van Rensselaer, Stephen (1764-1839), an American statesman, b. at New York. Descendant of Killian Van R., an early colonist. In 1789 entered the Assembly as a Federalist. In 1791-96 he was a state senator, and sat in the Assembly again in 1798 and 1803-10. Became major-general of militia in 1801, but resigned in 1812 on his defeat at Queenston by the British. Energetically promoted the Erie and Champlain canals, 1811-25. Sat in Congress, 1823-29.

Van't Hoff, Jacob Henry (1852-1911), a Dutch chemist, b. at Rotterdam; studied anatomy, chemistry, and mineralogy in Holland, France, and Germany, and in 1878 was appointed professor of chemistry at Amsterdam. In 1896 he became professor to the Academy of Sciences at Berlin. His great work was in connection with stereo-chemistry. Taking up the discoveries of Wislicenus in connection with the lactic acids, he enunciated in 1874 his discovery that 'in carbon compounds which exhibit the property of rotating the polarised ray in either direction, the molecule in every case contains at least one atom of carbon combined in four different ways' (Tilden), and, later, taking up Kekulé's doctrine of the linking of atoms, he worked it out with great success. In 1894 he pub. a paper which threw much light on the perplexed subject of solutions in electro-chemistry. *See On the Formulas of Structure in Space*, 1874; *Ten Years in the History of a Theory* (Eng. ed by Marsh); and various articles in periodicals; *see also* Tilden's *Short History of the Progress of Scientific Chemistry*, and E. Cohen's *Jacobus Henricus van't Hoff: Sein Leben und Wirken* (Leipzig, 1912).

Van Tromp, *see* TROMP.

Van Veen, Maerten, *see* HEEMSKERK, MAERTEN JACOBZ.

Van Wert, the co. seat of Van Wert co., Ohio, U.S.A. It manufs. railway engines. Pop. (1930) 8472.

Vanzetti, Sacco and, Case of. One

of the most famous cases in the court annals of the U.S.A., grew out of the murder, on April 15, 1920, of the paymaster and a guard of a shoe-factory at South Braintree, Massachusetts, and the theft of the money. In May, two Italian immigrants, Nicola Sacco, a shoemaker, and Bartolomeo Vanzetti, a fish pedlar, were arrested and charged with the crime. On May 31, 1921, they were tried by Judge Webster Thayer and a jury and on July 14 were found guilty. In the post-war period there was great intolerance of radical political opinions, and it was claimed by the defence that the accused did not have a fair trial owing to this feeling. Motion for a new trial was based upon the claim that the identification of the men was not complete. This was refused, as were other motions for new trials. In Nov. 1925 an Italian under sentence for another murder confessed that he had participated in the Braintree crime and exonerated Sacco and Vanzetti. Judge Thayer refused a new trial, alleging that the confession had been made solely that the criminal might delay his own execution. An appeal to the State Supreme Court failed, it being held that the trial judge had the final power to determine a matter of retrial. On April 9, 1927, Judge Thayer sentenced the men to the electric chair. A great outcry arose, not only in the U.S.A., but throughout the world. It was deemed shocking that one judge should pass upon all the facts and motions in the case, with no review by a higher court. Finally, a despairing appeal was made to Governor Fuller, who promised to review the papers in the case. At the same time he named President Lowell of Harvard University, President Stratton of the Massachusetts Institute of Technology, and Robert Grant to make an independent investigation. Both the governor and the committee found no ground for retrial or clemency and the men were executed, Aug. 23, 1927, protesting their innocence to the last. There still remains in the minds of many lawyers a grave fear that the case does not redound to the honour of American justice. The pathetic letters of Vanzetti have largely added to this feeling, as have various careful legal reviews of the case. See O. K. Fraenkel, *The Sacco-Vanzetti Case*, 1932.

Vapereau, Louis Gustave (1819-1906), a Fr. author, b. at Orleans. He became a teacher of philosophy, then an advocate, and finally abandoned law for letters. His *Dictionnaire Universel des Contemporains* (1858) and his *Dictionnaire*

Universel des Littératures (1877) are his best-known works.

Vaporisation or Evaporation is the 'quiet' change of a liquid to a vapour. V. occurs at the surface of a liquid in contrast with ebullition on boiling which is a 'violent' change of state from liquid to vapour taking place throughout the body of the liquid. The kinetic theory of matter explains the process of V. in the following way. The molecules of a liquid are moving incessantly, but the attraction of the neighbouring molecules handicaps the freedom of a molecule to some extent. A molecule near the surface of the liquid, however, may be moving with sufficient speed to break away from its neighbours when it escapes as a molecule of vapour into the surrounding atmosphere. Generally speaking, there is very little chance of the return of such a molecule, so that V. proceeds with a steady diminution of the amount of liquid. Any circumstances that favour the complete removal of the molecules of vapour from the vicinity will hasten the process of V., e.g. pools of water and laundry dry up more quickly on a windy day. V. is also accelerated by heating the liquid, for this increases the molecular velocities and favours their escape from the attractions of their neighbours. When V. proceeds inside a closed vessel, e.g. ink in a corked bottle, a state of equilibrium is reached when the number of molecules leaving the liquid is balanced by the number returning to it. The space above the liquid is then said to be *saturated* with the vapour. It should be noticed that saturation can take place only when there is an excess of the liquid. The pressure exerted by a saturated vapour can be measured by introducing sufficient liquid to saturate the space above the mercury in a barometer tube, when the level of the mercury falls by an amount that indicates the pressure exerted by the saturated vapour. It is found that the pressure exerted by a saturated vapour does not depend on the volume occupied by it, for if this volume is diminished, condensation takes place until equilibrium between the vapour and the liquid is restored. Similarly if the volume is increased, V. proceeds from the liquid until the increased space is saturated. The pressure exerted by a saturated vapour varies, however, with the temperature, e.g. at 15.5° C. saturated water vapour exerts a pressure of 13 mm. of mercury, while at 100° C. it exerts a pressure of 760 mm. of mercury. *Boiling* takes place when bubbles of vapour are formed in the interior

of a liquid. The vapour enclosed by the bubble is saturated, hence the pressure of this vapour must be at least equal to the surrounding atmospheric pressure or the bubble will be crushed. A liquid begins to boil, therefore, when the pressure of its saturated vapour is equal to that of the external atmosphere. Water boils at 100°C . when the atmospheric pressure is 760 mm. of mercury, because its saturated vapour exerts this pressure at 100°C .; ether boils at 35.5°C . under similar atmospheric conditions because its saturated vapour exerts a pressure of 760 mm. of mercury at 35.5°C . On the top of a mountain where the atmospheric pressure is considerably below 760 mm. of mercury, water boils at a temperature well below 100°C . Under a pressure of 2 atmospheres, water boils at 121°C ., while in the boiler of the new L.N.E.R. locomotive No. 10,000, where the pressure is 30 atmospheres, boiling does not occur although the temperature of the water is 235°C . Again, if water is placed inside a flask from which the air is gradually exhausted by means of a high vacuum pump, boiling will take place at room temperature. Moreover, since heat is required to vaporise a liquid, the temperature of the water will fall until it is actually freezing and boiling at the same time. See Thomas Preston, *Theory of Heat* (4th ed. 1929).

Vapour, see GAS AND GASES.

Var, a dept. in the S.E. of France, bounded by the depts. of Bouches-du-Rhône, Basses-Alpes, and Alpes Maritimes. It is a mountainous and wine-producing region; silk, paper, and soap also being manufactured. There are valuable fisheries. Area 2333 sq. m. Cap. Draguignan. Pop. (1926) 347,932.

Varallo, a tn. in the prov. of Novara, Piedmont, Italy. In the vicinity is Sacro Monte—a pilgrim resort. Pop. 3300.

Varangians, or Varings, the name given by the Gks. and Slavs to the Northmen or Scandinavian rovers who threatened Constantinople in the ninth and tenth centuries. They were checked by Vladimir, who christianised his subjects in 988, and from that time till the Turkish capture of Constantinople in 1453 there was a bodyguard of Varangians in the city. See Scott, *Count Robert of Paris*.

Varasdin, a tn. of Croatia, Yugoslavia, formerly a royal free city of Hungary. Pop. 13,398.

Vardar (anct. *Actius*), a riv. rising in the vilayet of Kossovo, Turkey, and flowing into the Gulf of Salonika.

Length about 200 m. The riv. was the scene of much fighting in the Great War, in the Macedonian campaigns, notably in the action known as the Battle of the Vardar, Sept. 15–25, 1918.

Vardon, Harry, Eng. golfing champion, b. 1870. Was three times open golf champion. Pub. *How to Play Golf*, 1912. See under GOLF.

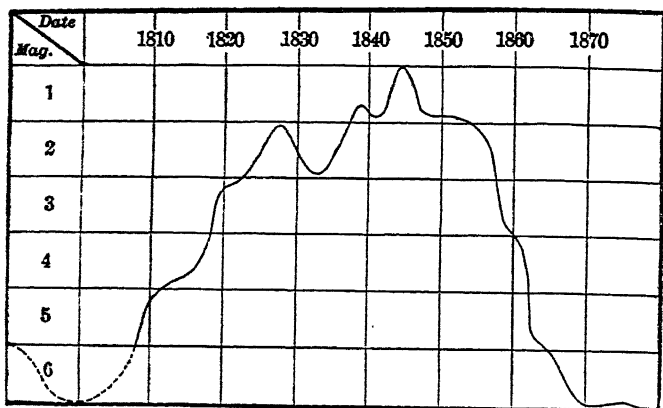
Variable Stars. Many thousand stars are known whose luminosity is variable; such stars are called V. S. The character of the variations exhibited by stars of this type led Pickering to group the stars into different classes according to the periods and features of their variations. The five classes of V. S. are known as (i.) *Novæ*; (ii.) *Long-period Variables*; (iii.) *Irregular Variables*; (iv.) *Short-period Variables* and (v.) *Eclipsing Variables*. (i.) *Novæ* or temporary stars exhibit a sudden increase in brightness followed by a rapid diminution of brightness, after which they slowly approach a fairly steady luminosity. Their features are discussed in the article on *NOVÆ*. (ii.) *Long-period Variables* include those stars whose period is of the order of 150–450 days, during which the fluctuations in their luminosities are so considerable that they may vary from stars of the third order of magnitude to stars of the eighth magnitude. These stars are of the spectral types M or N (see *STARS*) and the most famous star of this class is *o-Ceti* or *Mira* (*q.v.*). A satisfactory theory of their behaviour has still to be discovered. It is suggested that the cause of their variations may be analogous to the sun-spots that produce slight periodic variations in the luminosity of the sun, but the analogy is not very close. (iii.) *Irregular Variables* have no definite period and the range of their variations is generally quite small. *γ-Argus* (*γ-Carinae*), whose light-curve is shown in the figure, is an exception to this rule. Well-known stars of this class are *α-Orionis*, *α-Herculis* and *α-Cassiopeiae*. (iv.) *Short-period Variables* are stars whose period is of the order of a few days. Their range of variation is small, while their period is perfectly regular. The most important stars of this class are the *Cepheid Variables*, of which *δ-Cephei* is the prototype with a period of 5.8 days. For further details see *STARS*.—*Cepheid Variables*. (v.) *Eclipsing Variables* are binary systems; the eclipsing of one component of the system by the other produces the observed variations in their apparent brightness. The outstanding example of this class

is *Algol*, whose period is approximately 69 hours. An investigation of its light-curve proves that one component is bright and the other faint. See STARS.

Variation, in music, is a form in which a theme original or borrowed is first stated, then developed by varying key rhythm and tempo in a series of movements each closely allied to the original. In the classic form the composer never departed far from the theme, the V. consisting of embroidery (e.g. Haydn's *Kaiser quartet*); in the modern form the theme is used as an underlying feeling and the V.'s express the characteristics of different moods (e.g. Elgar's *Enigma Ps.*).

ditions and from these to find the integral involving them and one or more of their differential co-efficients, this integral to be a maximum or a minimum. See SARRUS, *Recherches sur le Calculus de Variation*, 1848; MOIGNO and LINDELOF, *Calculus des Variation*, 1861; TODHUNTER, *On the Calculus of Variation*, 1871; JELLET, *Calculus of Variation*; CULVERWELL, *Trans. Roy. Soc.*, clxxviii., 1887; CARL, *Calculus of Variation*, 1885; P. DE BOIS RAYMOND, *Math. Ann.*, 15, 1879.

Varicose Veins, a condition in which the veins are enlarged, being increased in length as well as in girth. They are found in the lower part of the body, affecting the lower leg and thigh, causing hæmorrhoids or piles



VARIABLE STARS

(From C. A. Young's *General Astronomy*. Ginn)

Variation, Calculus of. Just as the differential and integral calculus deals with the laws of fixed curves, the C. of V. traces a curve in its variations of form. The introduction was due to J. Bernoulli (1696) who propounded the problem: To find the path of shortest time traversed by a point M in falling freely under the influence of gravity from a point A to another B situated in a vertical plane. For this purpose it is necessary to consider not merely the change in y due to a variation in a single variable x , but the further variation due to a change in relation between a number of variables with which y is connected by some law. The problem resolves itself always into that of finding a number of functions satisfying the given con-

ditions and from these to find the integral involving them and one or more of their differential co-efficients, this integral to be a maximum or a minimum. They are caused by occupations involving a great deal of standing, constriction such as that caused by tight garters or pregnancy; or may be associated with general debility or a hereditary tendency. The best treatment for varicose veins in the legs is the wearing of an elastic bandage, and as much rest as possible with the legs horizontal or elevated. Varicocoele is rarely troublesome; if it causes real distress, the excision of the dilated veins will cure the disease. Recently the method of internal coagulation by a number of injections of salicylic acid has been practised with considerable success, in some cases the V. V. withering almost to the point of disappearance.

Varius, Rufus Lucius, a Rom. poet of the first century B.C. Mæcenas was his patron; and he was a friend of Horace and Virgil, becoming a literary executor of the latter (19 B.C.). His tragedy *Thyestes* was highly valued, and he also wrote epics. Only fragments are extant. See Weichert, *De Varro Poeta*, 1829; *De Varii Casti Parmensis Vita*, 1836.

Varley, Cornelius (1781-1873), an English water-colour painter, younger brother of John (q.v.), b. in London. He exhibited occasionally in the Royal Academy, and is noted as the inventor of the graphic telescope.

Varley, Cromwell Fleetwood (1828-83), an English electrical engineer, son of Cornelius. He invented a double-current key and relay and a cymaphen (a sort of telephone); also had a considerable share in the success of the second Atlantic cable.

Varley, John (1778-1842), an Eng. water-colour painter, b. at Hackney in London, but spent many years amid the picturesque and inspiring scenery of N. Wales. He exhibited in the Royal Academy and assisted in the foundation of the Society of Painters in Water-colours. Among his pupils were John Linnell and William Hunt.

Varna (ancient *Odessos* or *Tiberiopolis*), a prov. and fortified tn. of Bulgaria, on W. shore of the Black Sea, chief port between Kustendje and the Bosphorus. Meat, grain, and leather are largely exported. The Turks defeated the Hungarians in a battle here (1444). Pop. (dist.) 329,612; (tn.) 41,419.

Varnhagen von Ense, Karl August (1785-1858), a Ger. author, b. at Düsseldorf. He first studied medicine, then joined the Austrian army, and was wounded at Wagram. Later he entered the Prussian Civil Service at Berlin and again in Paris, and also fought in the Russian army. He married Friederike Levin Rahel, a christianised Jewess and a remarkably cultured woman, who gathered round her the chief men of letters and savants of her day. V. is chiefly famous as a biographer; among his works are *Musenalmannach*, *Goethe in den Zeugnissen der Mitlebenden*, *Biographische Denkmale*. His correspondence with Carlyle and with Rahel has been pub.

Varnish consists generally of a solution of resin in a solvent such as linseed oil or alcohol. The non-volatile drying oils (e.g. linseed oil) are natural Vs., and are usually boiled before use. Spirit Vs. are those in which the resinous material (copal, amber, etc.) is dissolved in a solvent such as alcohol or benzole. After application the solvent dries away

and leaves a thin coating of the resin which is apt to crack. Oil Vs. have the non-volatile drying oils as solvents. The oil does not evaporate but remains in the V., giving a toughness to the resinous film. See JAPANING; SHELLAC. See C. Cofignier, *Varnishes: their Chemistry and Manufacture*, 1923; R. S. Morrell, *Varnishes and their Components*, 1923; T. H. Barry and others, *The Chemistry of the Natural and Synthetic Resins*, 1926.

Varro: (1) *Gaius Terentius*, consul 216 B.C.; fought at Cannæ against Hannibal; ambassador to Philip of Macedonia, 203, and to Syphax, King of Numidia, 200 B.C. (2) *Marcus Terentius* (116-28 B.C.), a Roman soldier. He fought for Pompey in the Civil War, but after the Battle of Pharsalia was well treated by Cæsar, who made him his librarian. He was proscribed by the second triumvirate; and Antony destroyed his books and his villa, which were later restored to him. His chief works were satires after Menippus, poems, mock tragedies, *Antiquitates Rerum Humanarum et Divinarum* (used by Augustine and many others), *De Lingua Latina*, *De Re Rustica*, *Imagines*, etc.

Varuna (cf. Gk. *Οὐρανός*), the ancient Indian god of day; also the god of water.

Varus: (1) *Publius Atilius*, one of Pompey's generals in the Civil War against Cæsar. He destroyed Curio's army in Africa in 49 B.C., but after Cæsar's victory at Pharsalia (48 B.C.) Scipio was given command in Africa; and after the further defeat of Pompey at Thapsus, Varus joined Pompey's sons in Spain, and fell at the Battle of Munda (45 B.C.). See Cæsar, *B.C. I.*, 12, 13, 31; Cic., *Pro Ligario*, L. (2) *Publius Quinctilius*, a consul at Rome (13 B.C.), governor of Syria; about A.D. 7 sent to conquer and to establish himself in Germany. The Gers. revolted under Arminius, the Roman legions were annihilated, and V. killed himself. See Suet., *Vita Augusti*, 23, *Vita Tib.*, 16 (*Vita Augusti et Tiberi*).

Varzin, a vil. of Pomerania, Prussia. Prince Bismarck's country residence was here. Pop. 2100.

Vasa, Gustavus, see GUSTAVUS.

Vasarely, see MAROS VASARELY.

Vasari, Giorgio (1511-74), an Italian historian of art, was famous in his day as a painter and architect, and enjoyed the patronage of Clement VII. among others. Yet to-day his pictures, including the mural and ceiling decorations in the Palazzo Vecchio, Florence, are recognised as uninspired imitations of the work of Michelangelo, his master. There is critical merit besides trustworthy fact in his

celebrated *Lives of the Painters, Sculptors, and Architects* (1550). An Eng. trans. has been reprinted in the Everyman's Library (1927).

Vasco da Gama, see GAMA, VASCO DA.

Vascular System, of animals (Lat. *vasculum*, a little vessel). This is the system of tubes, present in most animals, and conveying blood to and from different parts of the body. In all Vertebrata and some Invertebrata such as the Annelida (*q.v.*), the V. S. is closed, forming a complete circuit conveying blood from the heart through a series of efferent vessels into capillaries. Through these the blood flows slowly, and the thin walls allow food and oxygen to diffuse into the surrounding tissues, while waste products from these pass into the capillaries. In the higher animals, capillaries in the kidneys allow the soluble waste products to diffuse into the kidney tubules, whence they are drained away and excreted. From the capillaries, the blood flows into afferent vessels returning it to the heart. The main efferent vessel is the aorta, and in fishes this sends branches to the gills, where the blood is oxygenated. The V. S. of animals with lungs includes a pulmonary circulation with efferent vessels conveying blood to the lungs and branching into capillaries in which oxygenation of the blood takes place, and waste carbon is eliminated as carbon dioxide. The oxygenated blood flows to the heart and is then circulated round the body. The efferent vessels of Vertebrata are usually termed arteries, and the afferent ones veins. Movement of the blood is slower in veins than in arteries, on account of the reduced pressure due to the retardation in the capillaries. To prevent any backward flow of the blood, veins are provided with valves. Only the roots of arteries, at their junction with the heart, have valves. Some Invertebrata, such as Mollusca (*q.v.*) and Arthropoda (*q.v.*), have an incomplete V. S. The blood flows from the ends of efferent vessels into body spaces and eventually returns to the heart through open afferent vessels. The Echinodermata (*q.v.*) have a water-vascular system, and their so-called V. S. consists merely of connective tissue with intercommunicating spaces, and is of doubtful function. See G. Oliver, *Studies in Blood Pressure*, 3rd ed., 1916; A. Krogh, *The Anatomy and Physiology of Capillaries*, 1923; E. H. Starling, *Principles of Human Physiology*, 5th ed., 1929.

The V. S. of plants is a series of cells and vessels conducting sap from the roots to the leaves, and the

soluble products of photosynthesis from the leaves to various parts of the plant. In the higher plants, the vascular tissue consists of wood or xylem and bast or phloem, but in the lower plants, such as the mosses and liverworts, there are merely conducting strands of thicker walled cells. In stems (*q.v.*) the xylem and phloem masses are collateral; in roots (*q.v.*), they alternate. They may be arranged in separate vascular bundles as in the Phanerogams (*q.v.*) or in concentric cylinders, the phloem being outermost, as in many Ferns (*q.v.*). As girth increases, more vascular tissue may be formed by the activity of the cambium (*q.v.*) in secondary growth. Much of the vascular tissue of plants consists of dead elements which aid the rise of sap by capillary attraction and, by means of their thick walls, afford mechanical support to the plant.

Consult J. A. Thomson, *Outlines of Zoology*; G. Haberlandt, *Physiological Plant Anatomy*; E. Strasburger, *Textbook of Botany*.

Vaseline, a term coined by Robert A. Chesebrough about 1870 and used by Chesebrough Manufacturing Company, Consolidated, as its registered trade mark upon the company's line of products, the chief of which is petroleum jelly, which is a semi-solid mixture of hydrocarbons, distilled from petroleum and purified, and used largely as an unguent, lubricant, etc.

Vasilkov, a tn. of Russia in the Ukrainian S.S.R. It was founded in the tenth century; and has a trade in cattle, corn, tobacco. Pop. 18,500.

Vassal, see FEUDALISM.

Vassar College, New York, for the higher education of women, was founded by Matthew V. (1792-1868) in 1861. It is situated in grounds occupying 450 acs. at Poughkeepsie, 3 m. from the Hudson R., and possesses a fine library, chapel, art gallery, hall of casts, etc. In 1906 the number of students was limited to 1000. See Lossing, *Vassar College and its Founder*, 1867.

Vasto, a tn. of Italy, on the Adriatic Sea, in the prov. of Chieti, and 31 m. E.S.E. thereof. It is famous for its olives. Pop. 15,538.

Vatican, The, a huge pile of buildings in Rome, celebrated as the home of the popes since their return from Avignon in 1377. The chapel of San Lorenzo dates from the papacy of Nicholas V. (d. 1455), and the Appartamento Borgia from that of Alexander VI. (d. 1503). The Sistine Chapel (1473), with its masterpieces of Michelangelo, Botticelli, and Ghirlandajo, was the work of Sixtus IV.; and the famous Loggia, of Julius II. (d.

1513). And thus through the centuries this vast irregular structure, which covers an area of 1151 ft. by 767 ft., and which embraces over 4000 rooms, besides eight grand staircases and numerous courts, halls, gardens, and galleries, has gradually spread; until to-day, even apart from the church, it is one of the most historic architectural records of the world. The actual residence of the pope was built under the direction of Sixtus V. (d. 1590) and Clement VIII. (d. 1605). The V. museum is the repository of the finest collection of Gk. and Græco-Rom. sculptures in existence; whilst in the Pinacotheca and elsewhere will be found the choicest works of Raphael, Perugino, Domenichino, and Titian. The Library contains many priceless MSS. embracing Hebrew and Oriental besides classical collections. On Dec. 22, 1931, part of the Library was destroyed by the collapse of the roof. Five lives were lost, but of the several thousand volumes destroyed the rarer treasures escaped. The Etruscan Museum is the achievement of Pope Leo XII. (d. 1829). It was at the V. that the famous Ecumenical Council assembled in 1869 when the doctrine of papal infallibility was defined. For details of the V. City State which was created in 1929, see LATERAN TREATY; PAPACY; PIUS XI.

Vatnajökull, a volcanic mountain in the S.E. part of Iceland, having an altitude of 5000-6000 ft.

Vauban, Sébastien le Prestre de (1633-1707), marshal of France, the most celebrated of Fr. military engineers. In 1678 he became 'commissaire-général des fortifications' and proceeded to strengthen the frontier defences, building the fortresses of Landau and New Breisach, etc., and rebuilding Strassburg (1681). But besides constructing or improving over 150 strongholds, he conducted forty sieges, including those of Lille (1662), Maestricht (1673), Cambrai (1677), Ghent (1678), Namur (1692), and Old Breisach (1703). His latter days were darkened by royal displeasure and neglect, for which a rather revolutionary economic treatise was in part responsible.

Vaucher, Jean Pierre (1763-1841), a Swiss botanist, b. in Geneva, and became professor and finally rector of the academy there. He pub. *Histoire des Conferves d'Eau douce*; *Histoire physiologique des Plantes de l'Europe*.

Vaucluse, a dept. and administrative div. of S.E. France, is divided into two regions: the valley of the Rhône, which consists of plains and level country; the other mountainous and

including the chains of the Lure and the Lubéron. The climate of V. is healthy and mild, except in the seasons when the mistral ravages the country. One of the principal cultivations of the dept. is madder, and silk culture is carried on. Wheat and other cereals are also grown. V. furnishes good wines, notably those of Sorgues. The cap. is Avignon. Area 1381 sq. m. Pop. (1926) 230,549.

Vaud (Ger. *Vaadt*), a canton of S.W. Switzerland. The canton is in the shape of a triangle, the base of which extends along one of the shores of Lake Geneva. The chain of the Jura Mts. cuts through the canton of V. in a S.W. to N.E. direction. The territory of V. was owned successively by the Fr., the emperors of Germany, the dukes of Zaebringen, and the house of Savoy. It did not become an independent canton until 1798. V. is the most prominent vine-growing canton in Switzerland. Wine, herbs, tobacco, clocks, and condensed milk are among the chief objects of industry or export. Salt is mined. Cap. Lausanne. Area 1238 sq. m. Pop. (1930) 331,323.

Vaudeville, a play in which dialogue is interspersed with songs. The word is a corruption of Vaux de Vire, the name of two valleys in Normandy. In the fifteenth century one Olivier Basselin, of Vire, composed a number of drinking songs, which spread over France, bearing the name of their native place. V. in the U.S.A. has practically the same implications as variety in Great Britain. The programmes are in the main made up of sleight-of-hand performances, juggling acts, knockabout comedians, singers and dancers, trained animal acts, with occasionally something more pretentious in the way of little one-act dramas or musical shows amounting to brief operettas. The real father of modern V. in the U.S.A. was B. F. Keith, who in the early eighties of last century started in Boston, and was soon so successful that he established a chain of houses all over the U.S.A., either owned by him or working with him. It became the famous 'Keith Circuit.' Other circuits grew up, one of the largest being the Orpheum. This was finally combined with Keith. V. began to assume such big proportions that managers formed a National Association, as did also the performers. One of the best results of this was the preparation of a standard contract. The Keith-Orpheum circuit built some of the finest amusement houses known in American cities of 100,000 and over. V.

became the school from which many actors graduated to the comic opera and film world. The famous team of Weber and Fields started in V., as did the theatrical and film favourites, the Marx Brothers. The prosperity of the V. theatres was threatened, however, when the films achieved popularity. To offset this the directors of the big circuits combined V. with films. One of the most notable results was the circuit universally known in the U.S.A. as the 'R.K.O.' This is a combine of the old Keith-Orpheum with some big film interests, and they in turn are linked up with the Radio Corporation of America. The combination of films with V. has given the V. houses a new lease of life. In fact, so popular are they and the straight film houses that many cities of the U.S.A. with a pop. of 100,000 or over no longer have theatres to which come companies giving a second season performance of New York successes, as in the old days. The cheap prices, the continuous performances, the absence of waiting between acts have proved too formidable for the 'legitimate' companies.

Vaudois, see WALDENSES.

Vaugelas, Claude Favre de, Baron de Pérages (1585-1650), Fr. grammarian, b. at Meximieux, near Trévoux, Jan. 6. Coming to Paris, he attached himself as gentleman-in-ordinary to Gaston d'Orléans, whom he followed into exile. In 1635 he was chosen a member of the Academy. A purist in style and speech, whose criterion was always the most frequent usage among cultured people, he worked for several years on his *Remarques sur la Langue française* (Paris, 1647), a book for a long time of unsurpassed influence. His influence was also exercised in person at the *salon* of the Marquise de Rambouillet. For thirty years V. worked on a translation of Quintus Curtius Rufus, pub. 1665.

Vaughan, Charles John (1816-97), headmaster of Harrow and dean of Llandaff; second son of Edward Thomas Vaughan, vicar of St. Martin's, Leicester. Educated at Rugby and Trinity College, Cambridge. V. was ordained in 1841 and appointed to his father's former parish. In 1844 he was chosen for the headmastership of Harrow, which position he held with distinction until his resignation in 1859. He accepted the mastership of the Temple in 1869, and the deanery of Llandaff in 1879. Numerous religious works and sermons were pub. by him; his first volume being *Memoirs of Harrow Sundays*, 1859.

Vaughan, Henry (1622-95), a Welsh poet, b. in Llanisaintffraed, Breck-

nock, and, as a native of the land of the anct. Silures, called himself 'Silurist.' Educated at Oxford and London, he settled as a physician at Brecon, and Newton-by-Usk. His first book, *Poems, with the Tenth Satire of Juvenal Englished*, appeared in 1646. *Olor Iscanus* (The Swan of Usk), a collection of poems and translations, was surreptitiously pub. in 1651. About this time he had a serious illness which led to deep spiritual impressions, and thereafter his writings were almost entirely religious. *Silex Scintillans* (Sparks from the Flint), his best known work, consists of short poems full of deep religious feeling. *Complete Works*, ed. A. B. Grosart, 1871; *Poems*, ed. E. K. Chambers, 1896; see E. Blunden, *On the Poems of Henry Vaughan*, 1927.

Vaughan, Herbert Alfred, Cardinal (1832-1903), the eldest son of Colonel John Francis V., was b. at Gloucester. He was first educated at Stonyhurst, thence went to a Jesuit school at Brugelette, Belgium, and afterwards to Rome in 1851 to study for the priesthood. At Manning's suggestion, V. was chosen to succeed Dr. Turner as Bishop of Salford in July 1872. On the death of Manning in Jan. 1892, he was appointed Archbishop of Westminster, and enthroned at the pro-cathedral, Kensington, on May 8. The following year he received a cardinal's hat from the hands of Leo XIII. In July 1894, V. started his great project for erecting a cathedral at Westminster, which he lived just long enough to see consummated; his funeral service there on June 25, 1903, being coincident with the opening of the building. See J. G. Snead-Cox, *The Life of Cardinal Vaughan*, 1910.

Vaughan, Robert (1795-1865), a Congregational divine, was pastor at Worcester (1819-25) and in Kensington (1825-43). He also held the chair of history in University College, London (1834-43), and was president of the Independent College at Manchester (1843-57). He founded the *British Quarterly* in 1845, and pub. *Life of Wycliffe*, 1828; *Revolutions in History*, 1859-63.

Vaughan, Thomas (1622-66), Eng. mystic, twin brother of Henry Vaughan. Became Fellow of Jesus College, Oxford. Wrote on magic and alchemy under the pseudonym Eugenius Philalethes. Works include *Anima Magica Abscondita*; or, a disc. of the universall spirit of nature, 1650; *Anthroposophia theomagica*; or, a disc. of the nature of man, 1650; *Magica Adamica*; or, the *Antiquitie of Magic*, 1650; *Aula Lucis*; or, *the House of Light*, 1652. The works

of V. were ed. for the Theosophical Soc. by A. E. Waite in 1919.

Vaughan Williams, Ralph, Eng. composer, b. Down Ampney, near Cirencester, Oct. 12, 1872. Educated Trinity College, Cambridge. The formation of his peculiarly individual style of composition is partly due to the influence of Eng. folk-song and old Eng. music to the time of Purcell. He has done valuable work in collecting folk-songs, chiefly in E. Anglia and Herefordshire. His first success was his setting of Whitman's *Toward the Unknown Region* (1907). The *London Symphony* was produced in 1914 and the *Pastoral Symphony*, one of his greatest achievements, in 1922. His works are characterised by strong melodic invention and an original fund of contrapuntal resource in which there is nothing reminiscent of scholasticism. His influence on the work of several Eng. composers has been considerable.

Vault, an arched covering to a building, formed of brick, masonry, or other strong material. The chief varieties of Vs. are the barrel, the groin, and the various types of Gothic. Besides these there is the dome, which is usually considered separately. The barrel V. is the earliest form, and was in use among the Egyptians in the fourth millennium B.C. It is almost always of semicircular cross-section. The groin V. is formed from the intersection of two barrel Vs., and so can only be used above a square area. By the addition of ribs at the groins there arose the Romanesque vaulting, which later gave way to the pointed Gothic ribbed Vs. of which specimens are common throughout the country. See ARCHITECTURE.

Vauvenargues, Luc de Clapiers, Marquis de (1715-47), a Fr. writer and moralist, son of Joseph de Clapiers, who was made a marquis in 1722. Born at Aix. In 1741 he was in garrison at Metz, and during the terrible retreat from Prague had both legs badly frost-bitten. Ruined in health, in 1745 he settled quietly at Paris, and devoted himself to literature. Among his principal works may be mentioned a volume of *Maximes*, *Introduction à la Connaissance de l'Esprit humain*, *Réflexions critiques sur divers Poètes*, and *Caractères*. The *Œuvres complètes de Vauvenargues* were pub. by C. de Saint-Maurice (Paris), 1821; and a new edition, ed. by D. L. Gilbert (Paris), 1857. See E. Lee, *La Bruyère and Vauvenargues*, 1903.

Vauxhall, a dist. of London in the bor. of Lambeth, formerly famous for its gardens, which were opened in 1660 (see *Vanity Fair* by Thackeray, and Pepps' *Diary*) and closed in

1859. V. Bridge is one of the fourteen road bridges over the Thames in the co. of London, and lies between Lambeth Bridge and the Grosvenor Railway Bridge.

Vavasour, a feudal term for one who held his lands from one of the higher nobility, and not directly from the crown.

Vecchi, Giovanni Dei (1536-1614), an Italian painter, worked with Zaddo Zuccheri on the palace of Caprarola at Rome, and also executed 'Martyrdom of St. Lawrence', and a fresco of the 'Four Doctors of the Church.'

Vecelli, Francesco (1433-1560), an Italian painter, was the brother of Titian, whose jealousy he excited by his 'Transfiguration' for S. Salvatore. But his best picture is a 'Nativity' in the church of S. Giuseppe at Belluno. Other works are: 'Ecce Homo' (Dresden); 'The Annunciation' (Venice).

Vector and Vector Analysis. An outcome of the theory of quaternions (q.r.), of which it may be said to be a simple application to many problems in practical mechanics and physics, enabling more rapid conclusions to be obtained by simplified processes. A V. is a geometrical quantity which is related to a definite direction in space; magnitude, direction, and sense are required specifications. If two Vs. are placed so that the beginning of the second coincides with the end of the first, then the V. from the beginning of the first to the end of the second is the sum of the Vs. A similar process applies to any number of Vs., and the theory is followed up on general mathematical lines. A simple geometrical application will serve as illustration:—To prove that the three medians AL, BN, CM, of any triangle ABC intersect at O and divide one another in the ratio of 1 to 2. In this simple case let $AO = a$, $LO = t_1a$, $OC = \gamma$, $MO = t_2\gamma$; then $BM = MA = t_1\gamma + a$, $BL = LC = t_2a + \gamma$; then $BO = 2t_1\gamma + a = 2t_2a + \gamma$, whence $t_2 = t_1 = \frac{1}{2}$. $BO = \gamma + a$, but $ON = (\gamma + a)/2$, so BON is a straight line, and since BO is twice ON, the medians divide one another in the ratio 1/2. In this example the small letters represent Vs., and it will be noticed they are used directly and not with reference to co-ordinates. The V. product ($\alpha\beta$) of two Vs. $\alpha + \beta$ is a V. perpendicular to both, its length represents to scale the area of the parallelogram generated by moving the second V. along the first, and the area is taken in the sense of the first V. The scalar product ($\alpha\beta$) of two Vs. is the area of the rectangle contained by α and the projection of β on it, and is a scalar. The former is often

represented $ab \sin \theta$, the latter $ab \cos \theta$; where a and b denote the lengths of a and b , θ the included angle, and ϵ the ort giving the aspect of the area. In the electromagnetic theory of radiation the method is now chiefly used. See Henrici, *Vectors and Rotors*, 1903; Wilson and Gibb, *Vector Analyses*, 1901; Heaviside, *Electrical Papers*, 1892; C. E. Weatherburn, *Vector Analysis* (elementary), 1921; (advanced) 1924.

Veda and Vedism. Veda is the general term for the anct. sacred literature of India. The oldest and most important work is the Rig Veda, which contains about 1000 hymns or religious lyrics dedicated to the greater gods of the Vedic pantheon, extolling their deeds and imploring them to come to the sacrifice. The hymns are divided into ten books, and were probably composed between 2000 and 1000 B.C. The Sama Veda is a collection of the words to be used at the soma sacrifice. The Vedic literature was the written expression of Vedism or the revelation of the self-existent Being by means of the Rishis. See SANSKRIT LANGUAGE AND LITERATURE.

Vedanta, Uttara-Mimamsa, or Upanishad, a system of Brahmanic philosophy which in its main features carries on the speculations of the older Upanishads; e.g. God is the sole real existence. He is both Creator and Nature, and all things are resolved in Him; the individual soul proceeds from Him and ultimately returns to Him; it is not a free agent, but is ruled by God, and its sufferings depend upon its bodily organs. These are the main features, but later Vedantists established other theories, e.g. Sankara-acharya maintained that the material world had no real existence, and Madhva-acharya claimed that the supreme spirit was distinct from man and matter. See A. B. Keith, *The Religion and Philosophy of the Veda and Upanishads*, 1926; W. S. Urquhart, *The Vedanta and Modern Thought*, 1928.

Veddalis, a people of the remote parts of S.E. Ceylon. Their civilisation is primitive, but they have many agreeable traits. They mix freely with the Cingalese in trade.

Vedder, Elihu (1836-1923), an American painter, studied in Paris under Picot, and also in Italy. Some of his pictures are in America; the Boston Art Gallery possessing his 'Lair of the Sea Serpent.' His illustrations to the *Rubdyūt* of Omar Khayyām are well known. Wrote *Doubts and Other Things*, pub. 1923.

Veen, Maarten van, see HEEMSKERK, MAERTEN JACOBZ.

Vega (α -Lyrae) was the pole star of the twelfth and thirteenth millenniums B.C., and will attain the same position in the fifteenth and sixteenth A.D. Huggins attempted to photograph its spectrum in 1863, but Draper succeeded in 1872. It is a Sirian star of magnitude 0.2, parallax 0.16", with a distance of 20.4 light years, and is approaching the sun at 10 m. per sec.

Vega Carpio, Lope Felix de (1562-1625), a Spanish poet and dramatist, b. in Madrid. He took part in the expedition to the Azores in 1582, and also served in the Invincible Armada in 1588. He was secretary to the Duke of Alva and the Marquis of Malpica, and in 1613 took holy orders. He was held in high estimation in his own day, and his influence in Spain was as great as that of Voltaire in France. He was a voluminous writer, and epics, pastorals, odes, sonnets, and novels all fell from his pen; but it is, however, to his dramatic works that he owes his eminent place in literary history, and of these he wrote altogether over 2000. Some of his best known are: *Los Rámites de Madrid*; *La Boba para los Otros y Discreta para si*; *El Perro del Hortelano*; *La Viuda de Valencia*; *El Maestro de Danzar*; *Las Flores de Don Juan*; *Desprecio agradecido*; *Estrella de Sevilla*; *Esclava de su Galán*; *Premio del bien Nalbar*; *Alcade de Talamca*. Among his other works are the *Angelica*, an epic poem, written in imitation of the *Orlando Furioso*; the *Arcadia*, a pastoral romance; *Dragonetea*, an epic poem concerned with the history and death of Drake; *Isidro*, a sacred poem which deals with the life of Isidore, patron saint of Madrid; *Peregrino en su Patria*, a romance; *Jerusalem Conquistada*, an epic in competition with Tasso; *Pastores de Belen*, a religious pastoral; *La Filomena, La Circe*, written in emulation of Cervantes; *Laurel de Apolo*, and *La Dorotea*, a prose drama. See J. F. Kelly, *Lope de Vega and the Spanish Drama*, 1902; H. A. Rennert, *Life of Lope de Vega*, 1904; H. A. Rennert and A. Castro, *Vida de Lope de Vega*, 1919; Angel Flores, *Lope de Vega, Monster of Nature*, New York, 1930.

Vega, Garcilaso de la, see GARCILASO DE LA VEGA.

Vegetable Marrow, the fruit of an annual trailing gourd (*Cucurbita Pepo orifera*) much grown in cottage and other gardens for use as a vegetable and for making preserves.

Vegetable Physiology, see PLANTS.

Vegetarianism, the practice of restricting the diet to food of vegetable origin. It is maintained that all the

essential ingredients of a wholesome diet are contained in vegetable foods, that there is less danger of disease than in a flesh diet, that a liberal allowance of nutritious food can be obtained at a comparatively low cost, and that the encouragement of vegetable food production would simplify many social problems and provide a healthful occupation for many people. The philosophical aspect treats of the relationship between food, morality, and the facts of evolution. It is demonstrated that it is consistent with the trend of evolution that man should live on a vegetable diet, or, to put it differently, man was intended by nature to be vegetarian. It is contended that it is inconsistent with man's position as a moral animal to prey upon the lower animals. In this way the tenets of vegetarians have in many instances been exalted into a creed of a semi-religious nature. From this standpoint, milk, which necessitates the killing of calves, and cheese are equally banned from a vegetarian diet. The term V., however, does not apply strictly to the non-flesh diet such as is advocated by Eustace Miles, E. J. Saxon and other leading food reform authorities. It is now generally admitted that only a small percentage of flesh food is necessary, and that the protein element in diet which meat ordinarily supplies can well be obtained from eggs, cheese, or ground-nuts. Protein from vegetables alone is inferior, and in a strictly vegetarian or fruitarian diet, nuts must form a staple food. From a curative point of view the value of a non-flesh diet cannot be over-emphasised. See S. H. Beard, *Comprehensive Guide Book to Natural Hygiene and Humane Diet*, 1922; E. L. B. Forster, *Vegetarian Cookery*, 1926; Hallie Miles, *Health without Meat*, 1927; H. Light, *Common Sense Vegetarianism*, 1929; M. Baines and E. J. Saxon, *Complete Guide to Sound, Successful, and Attractive Food Reform*, 1929; also Shelley's *On the Vegetarian System of Diet*, first printed 1919. The London Vegetarian Soc., 8 John St., W.C. 2, publishes a periodical, *The Vegetarian News*.

Vegetius, or Flavius Vegetius Renatus (fl. A.D. 375), a Rom. author, wrote an *Epitoma rei militaris* in five books, the first printed edition of which appeared at Utrecht in 1473. During the Middle Ages and later it was recognised as an authority on the conduct of war.

Vehmgerichte. These were tribunals which flourished in Germany, and especially in Westphalia, during the Dark Ages. Maximilian largely curtailed their privileges in the sixteenth

century, and Jerome Bonaparte formally slew the dead institution in 1811. From the emperor these courts derived a power over life and death. Their jurisdiction, administered much the same as in the ordinary courts, was in the hands of a society to which all freemen were eligible. The process of initiation, secret signs, and passwords remind one of freemasonry; and the elaborate system of espionage and the procedure observed in certain trials which, contrary to the usual custom even in the V., were conducted 'in camera' recall the methods of the Russian police. In modern Germany since the Great War various nationalist organisations opposed to the republic have had a species of V. and numbers of people have been 'executed' by young men assigned to the 'duty.' The victims were mainly members suspected of revealing the plans of the organisation.

Veii was an ant. city of Etruria, some 10 m. N.N.W. of Rome, and lying on a plateau near Isola Farnese. Until it was razed to the ground by Camillus after ten years' siege (396 B.C.), it was a formidable rival to Rome.

Veiled Prophet, see AL-HAKIM-IBN-OTTO.

Veins, in anatomy, the blood vessels that carry the blood from the tissues to the heart. Like arteries, they are composed of three coats, *tunica adventitia*, *tunica media*, and *tunica intima*, but in general there is less muscular and elastic tissue. The V. are generally divided into three systems: the *general venous system*, the *pulmonary system*, and the *hepatic portal system*. The general venous system returns the blood from the greater part of the organism to the heart. The pulmonary system brings back the oxygenated blood from the lungs to the left ventricle of the heart. The hepatic portal system carries the blood from the stomach, intestines, spleen, and pancreas to the liver by the portal V., ramifying into numerous capillaries. The pulmonary and hepatic portal V. have no valves. See H. Gray, *Anatomy*, 24th ed., 1930.

Veins, in geology, see DYKES.

Veit, Philipp (1793-1877), a Ger. painter. He was the son-in-law of Frederick Schlegel. He studied at Breslau and Rome. He worked with Cornelius and Overbeck in painting the frescoes of the Villa Bartholdy.

Veitch, Sir Harry James (1840-1924), Eng. horticulturist, b. Exeter, June 29, the son of James V. (1815-69) and grandson of the founder of the firm of James Veitch and Sons. He was educated at Exeter Grammar

School and travelled on the Continent, coming finally to London in 1853. In 1865 he became partner in the firm with his father and brother, John Gould V. After the latter's death in 1870, V. exercised sole control until 1900 when he retired. The business, while remaining in the family, was then converted into a company. V. was knighted in 1912 and was Vice-President of the Royal Horticultural Society, 1920-24. See James H. Veitch, *Hortus Veitchii*, 1906.

Veitch, John (1829-94), a Scottish man of letters, in 1864 appointed to the chair of logic and rhetoric at Glasgow. Besides *History and Poetry of the Scottish Border* (1877), he pub. poems and philosophical works. See *Memoir* by M. R. L. Bryce, 1896.

Velasquez, Diego (c. 1465-1523), a Spanish 'conquistador,' who entrusted Cortes with the conquest of Mexico (1518), and afterwards he is said to have hindered and annoyed Cortes by every means in his power. Yet Las Casas represents him in an amiable light. He was governor of Cuba, which he had conquered (1511-15).

Velasquez, Diego Rodriguez de Silva y (1599-1660), a Spanish painter, was a native of Seville, and learnt the rudiments of his art in the studios of Francisco Herrera and Francisco Pacheco, whose daughter Juana he married. From the day when Olivarez, King Philip IV.'s favourite, summoned him to Madrid, his life was an avenue ever leading him to better fortune, till finally (in 1651) he was burdened with the dignified office of 'Aposentador del Rey,' or court marshal to King Philip. His first visit to Italy and Rome, then as now the Mecca of the art student, covered the period 1629-31. He was intimate with Rubens and Ribera, and was chosen before the other court painters to commemorate 'The Expulsion of the Moors' from Spain (1629). Though he applied his master-hand to landscape, and to religious, classical, and historic painting, it was in portraiture that his genius and technique were both displayed at their highest. Thus, though all praise is due to his 'Surrender of Breda,' to his 'Bacchus' (so little Hellenic as to have earned the sobriquet of 'The Topers'), to his 'Christ on the Cross,' and to 'The Water-Carriers'—it is his portraits of Philip IV., which are legion, of Count Olivarez, and of 'The Maids of Honour' ('Las Meninas'), etc., which have won for V. his proudest eminence. Murillo, Juan de Pareja, and Juan del Mazo were his pupils. Consult W. Armstrong, *Life of Velas-*

quez, 1896; H. Stokes, *Velasquez, his Life and Works*, 1901; Randall Davies, *Velasquez*, 1914; C. Justi, *Velasquez und sein Jahrhundert* (3rd ed.), 1922-23; E. V. Lucas, *Velasquez*, 1924; see also *Velasquez in the Collection of the Hispanic Society of America*, monograph, New York, 1925.

Veleia, an anct. city of Italy, at the base of the Apennines, 45 m. from Parma. The tn. was destroyed about the end of the fourth century B.C. by a fall of earth and rocks. Excavations were begun in 1760.

Velez de Guevara, see GUEVARA, LUIS VELEZ DE.

Velez Malaga, a seaport of Spain, in the prov. of that name. It has a Moorish citadel, and produces raisins and olive oil. Pop. 23,425.

Velez Rubio, a tn. in prov. of Almeria, Spain, in the Sierra Maria Mountains. It has chalybeate springs. Pop. 11,500.

Velleius Paternulus, see PATERCULUS.

Velletri, a tn. in Italy; formerly belonged to the papal states. V. is the seat of a bishopric, and is an old and picturesque place built upon a hill. There is a municipal palace, and the gardens of the Lancellotti Palace are famed for their beauty.

Vellore, a tn. of British India in the prov. of Madras. Manufs. are cotton and indigo. The tn. is defended by a fortress of anct. origin, and has a military barracks. Pop. 50,000.

Vellum, see PARCHMENT.

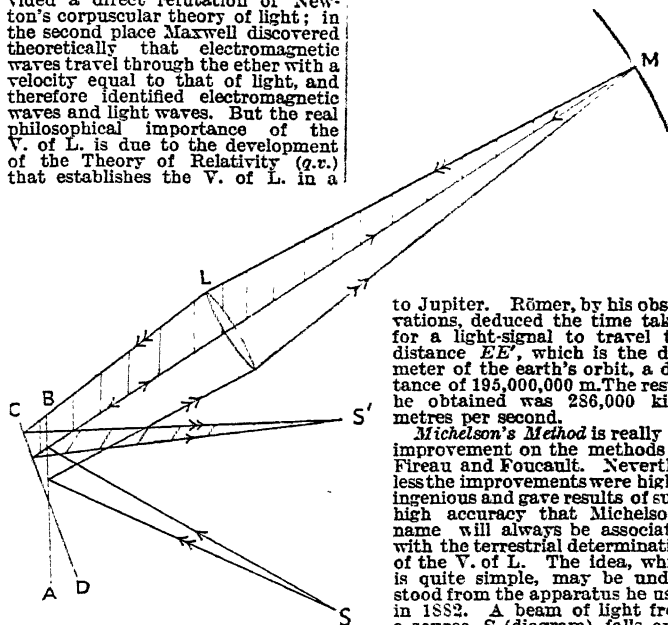
Velocipede, see CYCLES AND CYCLING.

Velocity is defined as the rate of displacement of a moving point. It is sometimes applied to the rate at which a change of state or configuration may take place in bodies. To specify V. completely, the direction as well as the rate at which the body is moving must be given, and hence it is a vector quantity. To determine the V. of a body, the distance passed over by the body is divided by the time it takes. This gives the average V. over that distance. If the V. is not uniform the instantaneous V. is required, which necessitates the use of the differential calculus. The unit of V. is defined as that V. with which a moving point passes over unit distance in unit time, e.g. foot per sec., cm. per sec.

Velocity of Light. Light travels through empty space at the rate of 186,000 m. per second, while its speed in air is only slightly less than this. The journey from the sun to the earth, a distance of approximately 93 million miles, occupies a ray of light for just over 8 minutes; in 1 second the light

traverses a distance rather more than seven times round the equator. The interest of the student of physics in the determination of the V . of L . is threefold; in the first place the experimental determination of the V . of L . in air and in water provided a direct refutation of Newton's corpuscular theory of light; in the second place Maxwell discovered theoretically that electromagnetic waves travel through the ether with a velocity equal to that of light, and therefore identified electromagnetic waves and light waves. But the real philosophical importance of the V . of L . is due to the development of the Theory of Relativity (*q.v.*) that establishes the V . of L . in a

eclipse of a moon occurs when the earth is at E , *i.e.* in conjunction with Jupiter, this 'light-signal' sent out from Jupiter will reach the earth earlier than in the case where the earth is at E' and in opposition



to Jupiter. Römer, by his observations, deduced the time taken for a light-signal to travel the distance EE' , which is the diameter of the earth's orbit, a distance of 195,000,000 m. The result he obtained was 286,000 kilometres per second.

Michelson's Method is really an improvement on the methods of Fizeau and Foucault. Nevertheless the improvements were highly ingenious and gave results of such high accuracy that Michelson's name will always be associated with the terrestrial determination of the V . of L . The idea, which is quite simple, may be understood from the apparatus he used in 1882. A beam of light from a source S (diagram) falls on a rapidly rotating mirror while it is in the position AB . The light is focused by a convex lens on the surface of a concave mirror M , whose centre of curvature is at the centre of the lens. The beam of light is therefore reflected as shown (the shaded beam) and it reaches the rotating mirror, now at CD ; it is reflected there and forms an image at S' . In this attempt the distance LM was about 2000 ft., while a turbine drove the mirror at the rate of 256 revolutions per second. By measuring SS' , the V . of L . can be deduced from the other data. In 1926, a few years before his death, Michelson made his final determination referred to above. The distance between the fixed mirror and the rotating mirror was actually 22 m., the former being erected at Mount San Antonio, the latter at the Mount Wilson Observatory. This enormous increase in the 'run' for the light was

vacuum as the greatest possible speed in nature, a speed that is an absolute constant; the V . of L . relative to all observers is the same. While the student is interested in these matters, everyone is intrigued by the methods for measuring such a great speed. Two of these methods are especially interesting, *viz.* (i.) Römer's determination in 1675; (ii.) Michelson's (*q.v.*) determination in 1926; the former is the first determination ever made; the latter, the most accurate, giving the result of 299,796 kilometres per second.

Römer's Method.—The planet Jupiter has several moons, and as they revolve around it they sometimes pass behind it, as seen from the earth, so that they are eclipsed. The time of an eclipse for any moon can be deduced by astronomical calculations. Reference to the figure on p. 434 of Volume Eight shows that if the

achieved by the design of a perfectly fashioned octagonal mirror, so that the image found was far brighter than when Michelson used a single mirror. Moreover, by adjusting the speed of rotation of the mirror, Michelson arranged that the light set off on its 44 m. journey from one face of the mirror and was received on its return by the succeeding face in exactly the same position occupied by its predecessor when the light set out. Thus the image *S'* was made to coincide with *S* and an inconvenient measurement was eliminated. *See also* MICHELSON-MORLEY EXPERIMENT.

Velsen, a vil. in prov. of N. Holland, Netherlands. A port of Amsterdam. Pop. 35,000.

Velvet (Lat. *villosa* and Fr. *velours*), a fabric believed to have originated in the East, possibly in China. Its surface is a short thick pile, produced by weaving a second set of warp threads over the already woven cloth, these threads being passed over wires and cut before the wires are removed. V. is made of pure silk, a similar material with a cotton back and silken face being termed velveteen. It is largely used for rich draperies and hangings: like stage curtains, church vestments, royal and ceremonial apparel, and, indeed, all manner of sumptuous attire. It is heard of as early as the thirteenth century, was first used for napkins and the mantles of knights templars, and is mentioned in a sumptuary law of Henry IV., which forbade any 'man not being a banneret, or person of higher estate' to wear 'velvet or motley velvet.' The expression 'motley velvet' is clearly an allusion to the rich brocades with V. piles introduced into their patterns, and perhaps also to the diaper designs produced by piles of varying length (pile upon pile). Up to the sixteenth century the finest Vs. were woven on the looms of Genoa, Venice, and Florence. To-day Crefeld and Lyons are two great centres of production.

Venaissin, an anct. prov. of France, between Durance and the Rhone. Cap. Venaque.

Vendace, or *Coregonus vandesius*, a small fresh-water fish of the salmon family, allied to the powan and pollan, found only in a few lakes in Dumfriesshire and in some of the Eng. lakes. It was formerly much valued as a table delicacy.

Vendée, La, a maritime dept. of W. France, comprising three divisions, viz. Bocage (woodland), Côte (plain), and Marais (marsh). The first-named occupies the greater portion of the dept. Agriculture is the chief industry, and wheat the most important crop. Pop. 395,600.

Vendémiaire (Lat. *vindemia*, vintage), a name applied to the first month of the year in the Republican calendar during the Fr. Revolution, extending from Sept. 22 to Oct. 24.

Vendetta, a modern survival of the primitive custom of blood feud or mode of self-redress by which fellow-kinsmen were bound to take vengeance for any personal injury done to a member of their clan or family. The V. is narrower than the old blood feud in that vengeance is exacted only in the single case of a murdered relative. It exists or did exist until recently in Corsica (*see* Prosper Mérimée's novel, *Colombo*) and in parts of Sardinia and Sicily. The Corsican legislature endeavoured with some degree of success to put a stop to the practice many years ago by prohibiting the carrying of arms, but that law having been repealed, the number of murders has since been on the increase until strong measures were taken by the French authorities in 1931 and 1932.

Vendôme, a tn. in the dept. of Loir-et-Cher, France. It was formerly the cap. of a co., which was afterwards raised to a duchy, and the dukes resided in its anct. castle. Manufs. woollen and cotton goods. Pop. 9800.

Vendôme, Louis Joseph (1654-1712), a marshal of France; son of Louis, second Duke of V., and great-grandson of Henry IV. Born at Paris. First saw service in the Dutch campaign of 1672, and in the war of the Grand Alliance served with distinction at Steinkirk and Marsaglia. In 1702 he was placed in command of the Franco-Spanish army in Italy, fighting two indecisive battles against Prince Eugene and overthrowing the Austrians at Calcinato (1706). In the Spanish campaign of 1710 he won his last victories. V. was one of the greatest of Fr. generals and exercised an extraordinary influence over his men. *See* Marquis de Segur, *Le Duc de Vendôme*, 1913.

Vendors and Purchasers. The law concerning contracts for the sale of land, and especially their specific enforcement in the Chancery Courts (as to which *see* SPECIFIC PERFORMANCE), is commonly referred to as the law of V. and P.; though, of course, personal property can equally form the subject of such a contract. Contracts for the sale of interests in land are, however, of such intricacy and so hedged round with technicalities (though to a less degree since the passing of the Law of Property Act, 1925), that it is always desirable in negotiating for sale or purchase to employ legal experts. (As to the form of such a contract, *see* under CONTRACT; and

FRAUDS, STATUTE OF.) No contract for the sale of land will stand unless: (1) It is quite clear what the subject-matter of the contract is. In this connection if the subject-matter can be ascertained, mere uncertainty as to the exact measurements will not of necessity invalidate the contract. (2) The price is fixed. A contract for sale 'at a fair valuation' is enforceable; but if the mode of valuation be specified in the contract the court will not decree specific performance until the price has been ascertained by the means so specified. (3) All other essential terms are included. All the court requires is that the agreement contains the necessary terms upon which to base a formal conveyance; hence the omission of trifling details is immaterial. Where it is contracted to sell in addition to land (*q.v.*) the goodwill (*q.v.*) of a business, it is essential to specify the time for completion of the sale. The duties of a vendor are: (1) To show and make a good title to the land in accordance with the contract. Formerly he was bound to deduce a title for a period of sixty years preceding the day of sale; later, by the Vendors and Purchasers Act, 1874, forty years' title, in the absence of any stipulation to the contrary, was substituted for the period of sixty years, and then, by the Law of Property Act, the period was still further reduced to thirty years. But in any case, the 'abstract of title' (*i.e.* the history of the title showing the successive steps in its transfer) must go beyond thirty years where necessary to arrive at a root of title, *i.e.* a point at which it can properly begin. The best root of title is a mortgage or purchase deed, as such a document leads to the inference that at the time of the execution thereof the title must have been investigated and in the case of a purchase deed the seisin (*q.v.*) of the possessor in title is shown. A general devise by will or a disentailing deed is not a proper root of title. (2) To enter into covenants with the purchaser. The most important are: (a) that he has a right to convey the land; (b) that the purchaser shall have quiet enjoyment of the land; (c) that the land is free from encumbrances; (d) that he will make all 'further assurances' (*i.e.* conveyances) that may be necessary; and in the case of sale of leasehold (e) that the lease is valid and the rent paid. (3) To execute a proper deed of conveyance (*q.v.*) on the payment of the purchase money. It is for the vendor to bear the cost of supplying a proper abstract of title, and he must also bear the expense of getting in all outstanding estates (*q.v.*) (in-

cluding outstanding legal estates) and paying off encumbrances and stamping all title-deeds. In the absence of express provision to the contrary the purchaser prepares and pays for the preparation of the deed of conveyance, though the vendor pays the costs of *perusal*. (4) To deliver to the purchaser all title-deeds in his possession or control. The duties of the purchaser are: (1) To peruse the abstract of title and make all his objections to it in reasonable time; (2) to prepare the deed of conveyance and deliver it to the vendor for execution; (3) on completion to pay the purchase money, or, if a deposit has been paid (as is usual by way of guarantee of good faith), the residue of the purchase money, together with any interest due for delay; and (4) to enter into possession of the land so as to relieve the vendor from any further liability incident to ownership. Breach of contract by the purchaser entitles the vendor either (1) to bring an action for specific performance and join with the claim a claim for damages (*q.v.*); or (2) to sue at common law for the price; or (3) to take out a summons (a summary remedy available only to decide questions as to title); or (4) to sue at common law for damages; or (5) to enforce his lien (*q.v.*); or (6) to resell and recover any difference in price from the purchaser; or (7) to sue for rescission. The purchaser has remedies corresponding to (1), (3), and (4) above; he may also sue (1) for rescission of the contract, adding a claim for the return of any purchase money paid; (2) to enforce his lien by claiming a declaration of his right thereto and an order for sale. The law of V. and P. was considerably changed by the Law of Property Act, 1925, which came into force on Jan. 1, 1926. This Act introduced a new system of making titles to land (*see* CONVEYANCING) and, generally, revolutionised the law of real property, though many of the topics or branches of the law of V. and P., *e.g.* the contract of sale, specific performance (*q.v.*), etc., are not materially affected. The underlying principle of the new system, in relation to V. and P., is to extend the doctrine of 'purchase for value without notice,' or, in other words, to keep the equities off the legal estate. Very often the title to the legal estate can be proved beyond reasonable doubt by the production of the more recent deeds, and purchasers would accept this as sufficient proof but for the doctrine of 'constructive notice'; that is to say, before 1926, a purchaser was bound by all equitable interests affecting the land unless he purchased the legal

estate without notice of them, and he is deemed to have notice of everything he would have discovered if he had investigated the title for the full period fixed by law in the absence of agreement. Therefore a purchaser should not accept less than the full proof to which he is entitled. The Act of 1925, however, provides a method by which the vendor can prove a legal title to the legal estate alone and the purchaser is protected from equitable interests even if he has notice. Where a conveyance of the legal estate to a purchaser is made after the Act, the purchaser will take the land free from equitable interests even if he has notice of them, in the following cases: (1) if the land is sold by a tenant-for-life or otherwise under the powers of a settlement (*q.v.*) the purchaser takes free from all the equitable interests of persons entitled under the settlement, but not from such equitable interests as restrictive covenants and equitable easements which existed prior to the settlement; (2) if the land is sold by trustees under a trust for sale, the purchaser takes free from all equitable interests of persons entitled to the proceeds under the document creating the trust and, if the trustees are appointed by the court or are a trust corporation (*see TRUSTS AND TRUSTEES*), the purchaser takes free from interests having priority to the trust for sale; but not from certain other interests, *if he has notice of them*, viz. interests protected by a deposit of deeds, restrictive covenants, easements, contracts to sell legal estate, etc.; (3) if the land is sold by a mortgagee, the purchaser takes free from the equity of redemption; (4) if the land is sold by a personal representative of a deceased owner, the purchaser takes free from the claims of persons interested in the estate of the deceased; and (5) if the land is sold under order of the court, the purchaser takes free from the interests of all persons who are parties to the action. But where there is no settlement or trust for sale the old rules of notice—actual or constructive—will still apply, except that a purchaser will take free from mortgages and charges not protected by deposit of title deeds; covenants restricting the user of the land; equitable easements; contracts for the sale of the land and all other equitable interests capable of being registered as land charges if these were created after 1925 and are not registered in the Office of Land Registry as 'land charges.' It is to be noted that the new Act does not give the purchaser protection against equitable charges, etc., protected by deposit of the title deeds of the legal

estate; nor against any interest of a person in land of which he is in actual possession. As stated above, the new Act also shortened the history of the title (in an abstract of title) from forty to thirty years, but an earlier title than thirty years may be required in cases similar to those in which earlier titles than forty years could formerly be required. Before Jan. 1, 1926, a purchaser who agreed to accept less than forty years was affected by all such equities affecting the land as he would have discovered by reasonable inquiries under a title for the full period, and this rule does not seem to be affected by the Law of Property Act, 1925, though the period is reduced to thirty years and a purchaser is protected against interests or matters capable of being registered and not in fact registered. Consult T. C. Williams and J. F. Iselin, *The Law of Vendors and Purchasers of Real Estate and Chattels Real* (3rd ed., as supplemented in 1927) and *Contract of Sale as affected by the Legislation of 1925*, 1930; Seaborne's *Vendors and Purchasers of Real and Leasehold Property*, 1929; J. H. Dart, *The Law of and Practice relating to Vendors and Purchasers of Real Estate*, 8th ed., 1929.

Veneering, the art of laying thin leaves, called veneers, of a valuable kind of wood upon a ground or foundation of inferior material, so as to produce articles of elegant appearance at a relatively small cost.

Venema (or Venemas), Hermann (1697–1787), a professor of theology at Franeker in the Netherlands. He was author of the *Institutes of Theology* (trans. 1850), and of commentaries on Daniel (1752), Malachi (1759), the Psalms (1762–67).

Vener, the largest lake of Sweden, 87 m. long and 44 m. broad. It is very indented, and receives several rivs. Its shores are high and rocky in the N., open and shallow in the S., and are fringed by several islands.

Veneral Diseases, *see* GONORRHEA and SYPHILIS.

Venesection, or Phlebotomy, cutting of a vein in order to let blood. V., together with other methods, such as cupping and leeching, was the chief remedial measure of mediæval physicians. The underlying idea was the elimination of the morbid 'humours' causing disease, and the practice was resorted to in all conditions of ill-health, and even healthy subjects were bled to prevent the accumulation of supposed harmful fluids. In modern practice it is employed in conditions where the blood-pressure needs to be reduced. The median cephalic vein at the bend of the elbow is usually selected.

Veneti, an anct. race who occupied Cisalpine Gaul in Northern Italy, around the delta of the Po. The Gks. called them Heneti, and they were supposed to have descended from a Paphlagonian tribe that settled in N. Italy under the leadership of the Trojan Antenor. They made alliances with Rome to protect themselves from Celtic invaders. On the conquest of the Cisalpine Gauls, the Veneti likewise became included under the Roman dominions. Many of their cities were plundered by the Huns under Attila (c. A.D. 450); and the remaining inhabitants took refuge on islets off the coast, out of which Venice has since grown.

Venetian Style, in architecture, a variety of Gothic developed in imitation of the thirteenth-century style of Salisbury, Amiens, etc. Its peculiar features are treated most carefully in Ruskin's *Stones of Venice*. See also ARCHITECTURE.

Venezia, a dept. of Northern Italy, comprising the provs. of Belluno, Padua, Rovigo, Treviso, Udine, Venice, Verona, and Vicenza. Area 9818 sq. m. Pop. (1923) 4,252,112. The dept. of Venezia Tridentina (area 5371 sq. m.; pop. 684,174) includes the provs. of Bolzano and Trento; that of Venezia Giulia e Zara (area 3355 sq. m.; pop. 1,004,037) those of Fiume, Gorizia, Pola, Trieste, and Zara.

Veneziano, Agostino, a Venetian engraver of the early sixteenth century. He was a pupil and assistant of Marcantonio Raimondi, and engraved many works, chiefly after Raphael. A fine collection of his works is preserved in the British Museum.

Veneziano, Antonio (c. 1309-84), an Italian painter, b. at Florence. He painted the walls of the council-hall at Venice in fresco; and a series, also in fresco, in the Campo Santo at Pisa, where his portrait, painted by himself, is hung.

Venezuela (Estados Unidos di Venezuela). This S. American republic occupies the whole of the lower basin of the R. Orinoco and the coastal plain surrounding the Gulf of Maracaibo, with a sea coast just within the Caribbean Sea and therefore facing the E. Indian Is. E. of Cuba and Jamaica. It is within the same latitudes as Nigeria, Ceylon, and the Malay Peninsula, from 2° to 12° N. lat., washed by the N. equatorial current, and exposed to the N.E. trades, which have a more easterly trend for the summer months. The average sea-level temperature varies from about 75° to 85° F., but like other tropical countries the range of climate coincides with elevation.

Where ocean winds penetrate, the region is healthy, otherwise malaria and other fevers are common. In the E. lies British Guiana; W., Colombia; S., Brazil. The first portion of the mainland to be sighted by Columbus, it fell to the Spaniards, and its history is connected with the piracy and slave trade of the Spanish Main. In 1830 it seceded from the republic of Colombia, and its present constitution dates from June 13, 1919. Congress consists of a chamber of deputies (77 members) and a senate (40 members). Senators are elected for three years and there are two for each state. Deputies are also elected for three years and there is one deputy for every 33,000 inhabitants and one more for an excess of 15,000 inhabitants. The president is elected by Congress for seven years; he must be a Venezuelan and over 30 years of age. He exercises executive power in conjunction with the commander-in-chief of the army and the Cabinet Ministers through whom he acts. Caracas is the seat of gov., but the constitution provides for the removal of the executive power to any other place if unforeseen circumstances demand such removal. The country is divided into a Federal District, twenty States and two Territories; the states have separate legislative assemblies and constitutions, with a president; they are divided into dists. and municipalities. The Federal dist. and the territories are administered by the president of the Republic through governors. The pop. in 1926 was 3,026,379 (estimated at the end of the year 1931 at 3,053,480), occupying nearly 400,000 sq. m., four-fifths of which forms part of the basin of the Orinoco. Of the pop. 10 per cent. are white, chiefly of Spanish descent; 70 per cent. mestizos, probably the largest proportion in any of the S. American states; the remainder Indians, negroes, and foreigners. The chief tns. are Caracas, Maracaibo, Valencia, Barquisimeto, Barquisimeto, San Cristobal, Ciudad Bolivar, Cumana, Maracay, and Coro. Cumana, the oldest existing European settlement on the continent, was almost entirely destroyed by an earthquake in 1929, but has since been rebuilt. The valley between the maritime Andes and the Sa. Nevada de Merida is the most densely peopled part of the state. E. and S. of this lies a densely wooded, thinly peopled, and largely unknown mountainous region, separated from the Orinoco by llanos, grassy plains, or prairies, with wooded portions here and there. These llanos are uniformly level and largely flooded during the rainy

season; the delta and borders of British Guiana are thickly forested and inhabited only by scattered Indian tribes. The Orinoco is navigable for large steamers for 375 m. to Ciudad Bolívar, the centre of the riv. trade, a place of 17,000 inhabitants, with steamer connection with Trinidad. Navigation varies greatly, the riv. being much lower in the dry season. Altogether there are some 11,000 m. of navigable water in V. The surface of V. comprises three well-marked zones—the agricultural, the pastoral and the forest. In the first are grown coffee (nearly 200,000 acres), cocoa, cotton, maize, sugarcane (about 600 plantations); the second is given over to stock-raising; and the third, which covers half the country, produces caoutchouc, balata (a kind of gum somewhat like rubber), copaiba, vanilla, etc.; but the forest resources are scarcely tapped. Over one-fifth of the people are engaged in agriculture or in cattle-raising. There are two million oxen in V., over two million goats and half a million pigs. V. is rich in metals, and is the second petroleum-producing country in the world (137 million barrels in 1929). Other important minerals are gold (obtained near Ciudad Bolívar), copper ore, magnesite, coal (obtained in the vicinity of Coro, and Naricual), iron, sulphur, and salt. Iron is obtained in the Imataca Mts. and the delta. Coal and petroleum are sought chiefly in the regions of Lake Maracaibo and the R. Guasare. Pearl-fishing flourishes, especially around the island of Margarita. There are but few secondary industries beyond cotton textiles of a cheap quality produced at Valencia and Caracas. Salt and matches are gov. monopolies. There is over £26,000,000 of British investments in V. Maracaibo is an important distributing centre, with a pop. of about 74,000. In 1929 the exports of V. attained a value of 735,214,000 bolívares (£20,117,000); imports 57,424,932 bolívares (£18,115,830). The chief articles of export are petroleum, coffee, cacao, goatskins, asphalt, sugar, hides and balata. The U.S.A. is the principal customer. Exports to V. from the U. Kingdom in 1930 were valued at £1,643,930; imports from V. into the U.K. at £798,337. La Guana is the chief port. Foreign vessels may not engage in the coastwise trade, except by special concession or by contract with the Venezuelan gov. There are twelve lines of railway: seven Venezuelan-owned, four British and one Ger., with a total length of nearly 605 m. The Great Railway of V. (113 m.) runs between Caracas and

Valencia; the Bolívar Railway (143 m.) between Tucucos and Barquisimeto. Electric tramways in Caracas are operated by a British company, and a British company supplies automatic telephonic communication in most parts of the settled country around the capital. There are about 360 post offices, and weekly air-mail services were established in 1930. There are wireless stations at Caracas, Cristobal, Barquisimeto and in a few other tns. There are some 4000 m. of road fit for motor traffic; motor vehicles in 1929 numbered 15,000, practically all of American manufacture. The Rom. Catholic is the state religion. There are two archbishops, one at Caracas and the other at Merida. Education has much improved in the last twenty years. Elementary instruction is free and compulsory and in 1930 there were nearly 2000 public primary schools and twenty public secondary schools. Superior instruction is divided into schools for special subjects, and these schools can unite to form universities. There are two universities—that of Los Andes at Merida and the Central Univ. at Caracas. Military service is compulsory and all Venezuelans serve for two years with the colours and in the reserve until the age of 45. The active army numbers 8000 men in all.

The country was first visited by Columbus in 1498, and in the following year by Alonso de Ojeda and Amerigo Vespucci. Columbus called the Gulf of Maracaibo 'Venezuela,' i.e. 'Little Venice,' in allusion to the number of Indian pile-built settlements on the coast and the shores of the lake, and this name was afterwards appropriated to the whole country. The country remained under Spanish rule until the revolution under Simón Bolívar (*q.v.*), when its independence was won at the battles of Lastoguanes (1813) and Carabobo (1821). V. was part of the Federal Republic of Colombia until 1830, but thereafter became absolutely independent. There have been a number of revolutions since 1846, and in 1864 the country was divided by President Falcon into states and formed into a Federal republic. On the dispute between Great Britain and the U.S.A. over the Venezuelan-British Guiana boundary, see ARBITRATION—*A. between Great Britain and the U.S.A.*; CLEVELAND, STEPHEN GROVER; and UNITED STATES.—*History.* See *Venezuela, Geog. Sketch, Natural Resources, Laws*, etc. (Bureau of American Rep., Washington); André, *A Naturalist in the Guianas*, 1904; T. C. Dawson, *The South American Republics*, 1905; A. H. Keane, *Central and South*

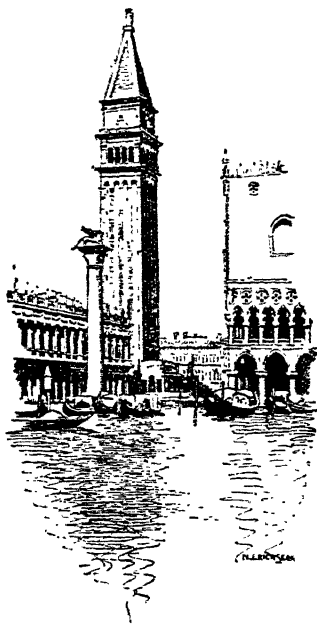
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Venial Sin, in Rom. Catholic theology, a sin that does not cut the soul off from God entirely.

Venice (It. *Venezia*), a city and seaport of N. Italy, cap. of prov. of Venetia, is built mainly on piles, on 122 small islands, intersected by canals, in the lagoon to the W. of the Gulf of Venice at the head of the Adriatic. A railway viaduct, 2½ m. long, connects it with the mainland. V. was noted for its textile manufactures as early as the fifteenth century; the principal manufactures at the present time are tapestry, brocades, silks, Venetian laces, wood-carving, artistic wrought-iron work, jewellery, bronzes, machinery, and clocks, and at Murano glass and glass beads. Its trade is mostly in transport, chiefly to the E.; in 1929 the ships entered and cleared numbered 3988, of a total tonnage of 4,178,000. V. is a base of the Italian navy. A great new commercial port is under construction on the mainland. The pop. in 1929 was 258,381. The distinctive features of V. are its situation in the lagoon and the canals by which it is intersected and by which all but foot traffic is conducted. Of its public buildings the following are the principal: the Doge's palace, standing on the site of a former official residence of the Doges, which was burnt in 976. Besides its painted ceilings and walls, there are many pictures by the Italian masters; the Accademia, whose twenty rooms are filled with some of the finest works of the Old Masters; the Museo Civico, with its collection of antiquities. Its churches, amongst which the principal are the cathedral St. Marco, St. Giorgio Maggiore, and Sta. Maria della Salute, are all most highly decorated with frescoes, mosaics, and carvings, besides containing many world-famed pictures. The Campanile of St. Marco has been rebuilt since its fall, on July 14, 1902, after standing a thousand years. The palaces of the nobility on the Grand Canal and other canals contain priceless collections of pictures. The Arsenal contains many models of the old Venetian ships, armour, collections of weapons, and spoils of war. An island to the S.E., the Lido, is now a fashionable seaside resort.

The Arts in Venice.—The earliest art in V. was Byzantine, and V. lagged behind other Italian cities in

forming a native style, but her masons, mosaicists, and glass workers soon became world famed. Amongst the foremost painters of the Venetian school are: Antonio Veneziano, the Vivarini, Jacopo Bellini and his sons and pupils, Carpaccio, Giorgione, Titian, Palma Vecchio Sebastiano, del Piombo, and Pordenone. During the fifteenth century printing flourished in V. to such an extent that more



THE PIAZZETTA, VENICE

books came from its presses than from Rome, Milan, Florence, and Naples together, and the name of Aldus Manutius stands for the finest work of his time as well as for the greatest output.

History.—The history of V. commences with the inhabitants of the plain to the N. of the Adriatic taking refuge from the incursions of barbarian tribes in the islands of the lagoon, first as a temporary measure in about 452. In 466 they took the first steps towards a corporate existence, and it was not till 568 that they abandoned the idea of a return to the mainland. At first the com-

munity was spread over twelve townships on various islands, of which Rialto, now V., was not the most important. After generations of struggle with the Lombards and the empire, V. became not only the greatest maritime power in Italy, but one of the most powerful in the world, trading with the Far East and distributing its imports throughout Western Europe; founding colonies and factories in the Morea, at Constantinople, and in many of the coast tns. of Syria, and acquiring territory on the mainland extending from the Adriatic to the Alps between the Mincio and the Po on the W., and the Isonza on the E. During this period she found a strong rival in Genoa, the next important of the Italian maritime states, and had to protect her shipping from the Dalmatian pirates, besides having many encounters with the empire and neighbouring mainland states. She took a leading part in the transport of the Crusaders to the Holy Land, and made vast sums out of this and her trading transactions. In the latter half of the fifteenth century, after gallant struggles, her decline commenced, of which the chief causes were the Turkish conquest of Constantinople, the discovery of the Cape route, and the rise of the great European Powers and their dominance in Italy generally; but the end did not come till 1796, when Napoleon, after the war with Austria, took possession of the tn. During the Great War, V. was frequently bombarded by enemy aircraft, but sustained comparatively little damage. See J. Ruskin, *Stones of Venice*; M. Oliphant, *Makers of Venice*, 1887; H. R. F. Brown, *Venetian Republic*, 1900; E. V. Lucas, *A Wanderer in Venice*, 1930; H. H. Powers, *Venice and its Art*, 1930; T. Okey, *Venice and its Story*, 1930.

'Veni Creator Spiritus' ('Come, Holy Ghost'), an early and very famous hymn for Pentecost, probably written by Rabanus Maurus (716-856). The translation in the Prayer Book ordination service is ascribed to Cranmer.

Venizelos, Eleutherios (b. 1864), Gk. statesman. Minister of Justice and Foreign Affairs in Crete, 1898, following on his successful leadership of the Cretan insurrection of 1897. Always a staunch Republican, he nevertheless remained loyal to the crown so long as he felt that the crown was loyal to the interests of the Gk. nation. He was Premier of Crete in 1909 and of Greece two years later, having saved the dynasty during the Balkan crisis of 1909-10 by his masterly revision of the Constitution

and co-operation informing the Balkan Alliance of 1912. At the very outset of the Great War he advocated Gk. intervention on the side of the Entente, but found no support from King Constantine. In Jan. 1915 he addressed a letter to Constantine setting forth (especially in regard to Gk. aspirations in Asia Minor) reasons why Greece should have supported the Allies, and it was the rejection of his policy that led to the fall of his administration later in the year. He wrote a second letter to the king in which he pointed out that the cession of Kavalla would be largely compensated by the acquisition of still greater territory in Asia Minor. He recognised that even if Greece remained neutral she would still be exposed to the greatest dangers, because by allowing Serbia to be crushed by an Austro-Ger. invasion Greece would have no security whatever that the Austro-Ger. armies would stop short of invading the Macedonian frontiers and coming right down to Salonika. But to all his arguments Constantine and the Gk. General Staff remained obdurate, and V. resigned in October 1915. Eventually he broke with Constantine and set up a provisional revolutionary gov. at Salonika. Late in 1917 he returned to Athens, being recalled to office, after the abdication of Constantine, by King Alexander. He was now head of the National Gov. and contributed to the efficiency and success of the Allied army at Salonika, reorganising the Hellenic forces. With Politis, he was chosen as Gk. delegate to the Peace Conference in Paris in 1919. But there is no doubt that he had enemies among the anti-republicans and, following an attempt on his life in Paris in 1920, he was heavily defeated at the polls. The failure of the Gks. in the war with Turkey in 1921-22 further embittered sentiment towards him (see GRÆCO-TURKISH WAR). After the revolution in Greece in 1922, however, he represented his country at the Lausanne Conference, and, in 1924, once more became Prime Minister, the country having meanwhile become a republic. Later, to avert the evils of dictatorship, he used his great influence to overthrow the gov. and again became Prime Minister in 1928, this term of office being marked by advantageous treaties of friendship with Italy, Yugoslavia, Turkey, and other countries. Has recently (1931) shown his statesmanlike qualities in his utterances regarding the revolt in Cyprus. See V. J. Seligman, *Victory of Venizelos*, 1920; S. B. Chester, *Life of Venizelos*, 1921; H. A. Gibbons, *Venizelos*, 1921.

Venlo, a fortified tn. of the Netherlands in the prov. of Limburg, on the Meuse. Pop. (1928) 23,200.

Venn, Henry (1725-97), an Eng. evangelical divine, b. at Barnes, Surrey, and educated at Cambridge. Was ordained in 1747 and became successively vicar of Huddersfield, and of Yelling in Hunts. He wrote *The Compleat Duty of Man*, 1763; and *Mistakes in Religion*, 1774.

Venomous Bites. Some snakes are provided with poison-glands connected with grooved fangs. One lizard, the heloderm of N. America, has poison-glands. Centipedes have poison-sacs connected with the jaws. Spiders paralyse their prey by stabbing with poison-claws. Gnats and mosquitoes are provided with poison-glands in the mouth, but the greatest danger from insect bites is the possibility of bacterial or protozoic infection. Insect poison is usually formic acid, and may be counteracted by an immediate application of ammonia. The best treatment for snake-bite is injection of antivenine.

Venosa, a city in prov. of Potenza, Italy, the birthplace of Horace, 52 m. S.S.E. of Foggia. Pop. 9180.

Venta, the name of three cities of anot. Britain—Venta Belgarum, with which Winchester is identified; Venta Icenorum, probably Caistor on the Wensum, near Norwich; and Venta Silurum, near the site of the Cæwent, in Monmouthshire.

Venti, the winds, represented in classical mythology as the servants of Æolus, who shut them up in his cave and only released them at his pleasure. The chief winds were Zephyrus (W.) of the springtime; Notus (S.); Boreas (N.) of snow and tempests; Typhon, a destructive wind, the son of Typhæus; and Africus.

Ventidius, Bassus Publius (*fl.* first century B.C.), a Rom. general, b. at Picenum. He began life as a muleteer and chairman; but was noticed by Cæsar, under whom he served in the Gallic and civil wars, and became tribune and senator. In 43 B.C. he was elected consul, and in 39 joined Labienus in Asia and defeated the Parthians in three battles. He celebrated his triumph in Rome in 38 B.C.

Ventilation. The process of removing vitiated air from and supplying fresh air to rooms, buildings, mines and other confined places, so as to maintain the atmosphere in such places in a constant state of purity. Considerable progress has been made in recent years in the development of ventilating apparatus, the advantages accruing from a

plentiful supply of pure air at a suitable temperature and humidity being generally admitted, though expert opinion differs as to the apparatus which is calculated to give the most satisfactory results.

Physiological Aspect of Ventilation.

—Air is composed chiefly of oxygen and nitrogen, but it is upon the oxygen that the heat and energy of our bodies depend. Carbonic acid gas is also found in small quantities, the permissible quantity being about 0.6 part per 1000 cubic ft. Gas while burning is a great polluter of the air, 8 cubic ft. of air being consumed by 1 cubic ft. of gas. It has been found that 1000 cubic ft. of air contain .4 part of carbonic acid gas, and the breathing of persons produces on the average about 0.6 part per 1000 cubic ft. These added together make 1.0 cubic ft. per 1000 cubic ft. of air. This is in excess of the standard mentioned above, namely .6 per 1000 cubic ft. It is not, now, however, believed that the percentage of carbonic acid gas is of any great moment, but rather that the essential point is the air temperature and percentage of moisture present. Experiments lead to the inference that a specific quantity of carbonic acid gas is not in itself injurious, but is to be regarded as an index of the contained organic impurity which may be harmful. A scientific way of determining the quality of V. is by the use of synthetic charts by which all the factors that influence V. are considered. These factors are temperature, humidity, bacteria, content of carbonic acid gas, motion of the air, efficacy of air distribution, etc., and the chart is so graduated that each of these factors influencing adversely the quality of V. can be separately shown. Each person requires 3000 cubic ft. of pure air per hour, and it is necessary to change the air several times during the hour to obtain this amount. This is the object of good V. Care must be taken to prevent draughts, and air that travels at a greater rate than 2 ft. per second will produce draughts. In practice it has been found impossible to obtain the above amount of air per person and examination of many of the houses of the poorer quarters discloses the fact that a great number are overcrowded, and the V. of many buildings like schools, theatres and cinema houses is often very poor. In practice the amount in public halls in Great Britain is 1200-1500 cubic feet per person; in hospitals 1200-3000 cubic feet. But in the U.S.A. some 1800 cubic feet per person is the minimum volume allowed for public buildings. Two methods

of V. are adopted: (1) natural or gravity; (2) artificial or mechanical; and in each method due regard is paid to lighting and heating.

(1) *Natural or Gravity Ventilation.*—This is conducted by means of inlet and outlet tubes by natural methods. *Inlet tubes.*—These should be as free from bends as possible, and should be so arranged as to deliver the air into the room at a height of about 6 ft. so as slightly to warm the incoming air before it reaches the heads of the occupants. The size of the opening should be based upon about 24 sq. in. per occupant. *Outlet tubes.*—Hot air always rises and outlet tubes should be placed high up in the room and as far away from the inlets as possible. The provision of inlets should be slightly in excess of that of the outlets.

(2) *Artificial or Mechanical Ventilation.*—This is the system by which the air is propelled into the room or the foul air is extracted from a room by mechanical means. In mechanical V. the air moved is frequently utilised as the conveyor of heat, and the systems employed are often known as 'hot-blast' systems. In the U.S.A. hot-blast heating for public buildings, as generally adopted, is not universally favoured, because the high temperatures to which the air is raised produce chemical changes by decomposing some of the dust particles, so that the air becomes vitiated before it enters a room. But good results are to be obtained by hot-blast or indirect heating, provided the temperature of the heating surfaces and of the air is kept low and the heating surfaces kept as free as possible from dust. In large buildings, however, independent heating and ventilating are now general, direct heating surfaces being used to replace the heat lost by windows or other cooling surfaces. Hot-blast systems of heating and ventilation possess advantages for industrial buildings, because the whole of the heating surfaces and power units are centralised, and in the adoption of this system the U.S.A. is ahead of Great Britain.

Mechanical ventilating plants are usually classed either as 'vacuum,' 'plenum' or 'combined.' The vacuum system is worked by using exhaust pumps, gas jets, or furnaces for extracting the foul air from the rooms and allowing the fresh air to take its place. When air is propelled into a room it should be slightly heated, and, if it is to be used for a number of rooms, heating coils should be used to warm the air before it enters the rooms. An effective system is that by which the foul air is

extracted by means of an exhaust ventilator in the roof, the fresh air being admitted by inlet tubes, purified by passing through cotton wool and heated by having a small heating coil in each ventilator. Badly designed vacuum systems are liable to produce draughts, owing to inward leakage of air around doors, chimneys, etc. For localised V. a vacuum system is valuable, such as for the direct removal of dust and fumes produced by dangerous trades. The *plenum* consists of forcing purified air into the rooms by fans or air pumps, thus forcing out the foul air. The chief advantages of this system are less liability to draughtiness and the better diffusion of the inflowing air; the defects arise mainly through the outlet, V. being controlled more or less directly by natural agencies. The extent to which this weakness becomes evident is governed by the disposition of the outward ducts. The *combined* system, i.e. which combines the vacuum and plenum systems, is the one which is the least liable to derangement. A combined installation permits the control of both the inflowing and outflowing air, and when the propelling and extracting forces are properly balanced, the opening of windows or doors will have no adverse effect upon the system at any other point. But the initial and working cost is greater in this than in the separate systems.

Fans.—Fans are used both for extracting the air from and for propelling the air into a room. By the use of fans of given power, the exact amount of air can be produced or extracted according to the number of persons using the rooms.

The Ventilation of Tunnels.—This is effected by withdrawing the foul air from the tunnel at a point or points midway between the ends, and propelling fresh air into the space by means of powerful fans.

Ozone.—As an adjunct to ventilating plant, the use of ozone has advantages as a deodoriser and for imparting freshness to the air. But it is used only in a diluted form, a high concentration being harmful as it acts as an irritant on the respiratory tract. Ozonised air is much used by the tube railways, the proportion used being one part of ozone in 10 million parts of air.

Ventilating Radiators.—The ventilating radiator is a common method of warming the inflowing air to a room. The radiators made by the National Radiators Company and the ventilating flue radiators of the Beeston Foundry Company afford examples. Ventilating radiators should be pro-

vided with simple means for regulating air supply. In the National Radiators Company's types of radiator, the air inlet is controlled at the base by a slotted side, or, in other cases, by a louvred ventilator operated by a lever and quadrant placed above the ventilator. Consult F. W. Raynes, *Sanitary Engineering, Plumbing and Heating Systems*.

Ventimiglia (Fr. *Ventimille*), a port of Liguria, Italy, and frontier town between France and Italy. Has a fine Gothic cathedral, and the celebrated Balzi Rossi grottoes, containing paleolithic remains. Pop. 14,890.

Ventnor, a tn. in the Isle of Wight. The climate is mild and suitable for invalids and consumptives. In summer it is a pleasure resort. The National Consumption Hospital is outside the tn. Pop. (1931) 5110.

Ventriculites, a genus of fossil sponges with a funnel or top-shaped cup. They are most abundant in the Cretaceous system.

Ventriloquism, the art of speaking in such a manner that the sound appears to be produced at a distance from the speaker. The origin of the word, from *venter*, belly, suggests that the voice was supposed to proceed from the speaker's stomach. The words are, however, produced in the usual manner, though some consonants may be masked by the immobility of the lips and teeth and the restricted use of the tongue. The art was practised by the anc. Gks. and Egyptians, and has had various uses, from mere entertainment to religious charlatany. See A. Prince, *Whole Art of Ventriloquism*, 1920.

Venue. In an indictment the V. is the statement of the county or other geographical division from which the sheriff has summoned the grand jury by whom a 'true bill' has been found (see **INDICTMENT**, and **JURY**), and also, as a rule, the place where the crime was committed. As the V. should, by the common law, be the jurisdiction within which the crime was committed, the trial generally takes place there too. But to this general rule there are exceptions, e.g. offences committed by persons on a British ship (see **MERCHANT SHIP-PING**) may be tried in any county where the offender is in custody, offences against the Customs Acts are triable in any county; again the V. as to forgery, bigamy, larceny, or embezzlement by public servants may be laid either in the county where the crime was committed, or in the place of arrest; and there are special rules applying where the offence was committed partly in one and partly in another county.

Venus, the most conspicuous and

brightest planet. *Phosphorus*, the morning star, and *Hesperus*, the evening star, was its name among the Gks. It is visible in daylight. It moves at a mean distance from the sun of 67.2 million miles in an orbit of less eccentricity, .007, than that of any other planet, at a velocity of 22 m. per sec.; the revolution is completed in 225 days, sidereal period, its synodic period being a year and seven months. Its arc of retrogression is 16°, the inclination of its orbit 3½°. The apparent diameter varies from 11 to 67 sec., its distance from the earth varying from 26 to 160 million miles. The real diameter is 7700 ± 30 m., the planet being practically the same size as the earth therefore, and her mass is 82 per cent., density 88 per cent., superficial gravity 85 per cent. that of the earth. Owing to her position within the earth's orbit V. exhibits phases: the discovery of the Gibbons phase by Galileo in 1610 being one of the facts which disproves the Ptolemaic system, and supports that of Copernicus. The transit of V., its passage across the sun's disc at inferior conjunction, is a rare phenomenon, and occurs at or about either June 5 or Dec. 7; actual past or future dates are Dec. 7, 1631; Dec. 4, 1639; Dec. 9, 1874; Dec. 6, 1882; June 5, 1761; June 3, 1769; June 7, 2004; June 5, 2012. Horrox and Crabtree in England were the first (1639) to observe a transit; since then they have been specially observed elaborately by scientific expeditions to the best stations. The matter is of great importance as one of the important means of determining the parallax (q.v.) of the sun. *Surface markings*.—Nothing is yet determined with any certainty, but it is quite possible there are ice caps and mountains. Bright spots at the cusps and obscure but possibly definite markings near the rather shaded terminator, together with irregularities on the rim, are the bases of any deductions. The undoubted presence of an atmosphere renders observation difficult; a thin line of light when the planet is near the sun, and extension of the horns beyond the diameter, indicate an atmosphere, but less extensive than that of the earth. Faint lights on the dark portion of V. have also been recorded. The *rotation period* is still undecided. Shroeter gives 23 hrs. 21 min., but Schiaparelli and Lowell (1896) give 225 days, the period thus corresponding with that of revolution as in the case of the moon. The longer period is supported by the fact that no sensible difference has been observed in the lengths of diameters of the planet. V. is a

disappointing planet when observed even under the best conditions as to proximity. It displays only a crescent disc like a miniature moon, with no details or markings to vary it. The disc is merely a white expanse, the result of its dense atmosphere which hides its real landscape. V. is sometimes termed the sister planet to the earth, its size and distance from the sun being much the same. Periodically it appears both as a morning and an evening star, not setting until shortly before midnight. This occurs every eighth year, i.e. in alternate leap years.

Venus, see APHRODITE.

Venusberg, in Ger. mythology, a cave palace among the mountains, where Venus held her court. The knight Tannhäuser dallied there until he was satiated with its sensualism. He later received absolution from Pope Urban.

Venus's Fly-trap, see DIONÆA MUSCIPULA.

Venus's Looking-glass (*Specularia peruculum*), a campanulate plant with purple flowers often grown in garden borders and beds.

Vera, Augusto (1813-85), an Italian philosopher, b. at Amelia in Umbria. He became professor of philosophy at Naples (1862-85). Author of *Introduction à la Philosophie de Hegel*, 1855, and *Strauss et l'Antienne et la Nouvelle Foi*, 1873. See monograph (1887) of Mariano.

Vera Cruz: (1) The state of V. C., Mexico, is 27,880 sq. m. in area. The surface is broken up by large tide-water lagoons and rivs., behind which is a gently rolling stretch of fertile lands which rise gradually to the base of the Sierras, whose valleys and precipitous wooded slopes form the S.-eastern flank of the great centre tableland. The climate is subtropical and is enervating to Europeans. There is weekly steamship communication with New York and Havana and also a weekly service of fruit boats to New Orleans. The products are cedar, fancy and hard woods, sugar, alcohol, vanilla, tobacco, bananas, and beans. There are textile mills and breweries in Orizaba, and soap factories and flour mills in the state. There are oil-fields in the northern and southern parts of the state. Pop. (1921) 1,160,000. Jalapa (q.v.) is the cap. (2) A seaport lying on the S.W. coast of the Gulf of Mexico. It is built on low-lying sand-banks and has an est. pop. of 71,000. It has a harbour protected by sea-walls.

Verapoli, a tn. of Madras, India, in Travancore. It is the seat of a Carmelite mission and of the vicar-apostolic.

Veratrine, a poisonous crystalline

powder derived from *sabadilla* seeds by bruising, boiling in alcohol, and precipitation with an alkali. It is sometimes used externally as a local anæsthetic.

Veratrum, or False Hellebore, a genus of perennial plants (ord. Liliaceæ) with decorative leaves and panicles of white, green, or purple flowers. *V. album* yields the poisonous powder known as Hellebore powder, which is mixed with water and used as an insecticide.

Verbena, or Vervain, a genus of herbaceous plants and shrubs. *V. officinalis* is the common British wayside plant, with slender spikes of small lilac flowers. A number of species are grown in the garden, as well as numerous hybrids. The lemon-scented V. is *Lippia* or *Aloysia citriodora*.

Verbenaceæ, a natural order of trees, shrubs, and herbaceous plants, mostly tropical. The most important is teak (*Tectona grandis*). Many species are fragrant.

Verboeckhoven, Eugen Joseph (1799-1881), a Flemish painter, b. at Warneton in W. Flanders. He chose his subjects principally from peasant and outdoor life, and was particularly skilful in painting sheep and cattle.

Vercelli (anct. *Vercellæ*), a tn., with considerable commerce in rice, on the Sesia, 12½ m. S.W. of Novara by rail, in Piedmont, Italy. There are large farms in the neighbourhood. The library contains the valuable Vercelli Book (q.v.), and there is a sixteenth-century cathedral. Pop. (commune) 35,500, (tn.) 29,300.

Vercelli Book, or Codex Vercellensis, an Early English MS., which was discovered in 1822 by Dr. Friedrich Blume, a German jurist, in the cathedral library at Vercelli (q.v.). It appears in C. W. M. Grein's *Bibliothek der A. S. Poesie*, vol. ii. (Leipzig, 1904). Besides six homilies and a prose 'Life of Guthlac,' it contains six poems, including 'Andreas,' the 'Dream of the Rood,' and an 'Address of the Soul to the Body.'

Vercingetorix, chieftain of the Averni, a Gallic tribe. He led a revolt against the Romans with great ability. Captured by Caesar after the fall of Alesia (52 B.C.). After adorning Caesar's triumph of 45 B.C. he was put to death.

Verd-Antique, the old Fr. name for what the Romans called *lapis atracius*, from Atrax in Thessaly, its place of origin. It is a fine green serpentine mixed with limestone, variegated often with brown or white patches. The columns of the Lateran basilica are composed of this stone.

Verde, Cape, see CAPE VERDE ISLANDS.

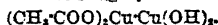
Verden, a tn., with breweries and cigar factories, in Hanover, Germany. There is an anct. Gothic cathedral. Pop. 10,000.

Verdi, Giuseppe (1813-1901), an Italian composer, b. at Parma, studied under Provesi and Lavigna; first opera, *Oberto* (1838), given at La Scala, Milan, with great success, followed by *Ernani* (Venice, 1844), and several others. Just before 1850 he travelled to London and Paris: on his return to Italy he wrote: *Rigoletto*, 1851; *Il Trovatore*, 1853; *La Traviata*, 1853; *Un Ballo in Maschera*, 1859; and *Don Carlos* (Paris, 1867). Under the influence of Wagner, V. excelled his previous efforts by *Aida* (Cairo, 1871); *Otello*, 1887; and *Falstaff*, 1893. V. formed the connection between Rossini and Wagner, and his tradition was followed by Puccini. His *Mazzini Requiem* (1874) must also be mentioned. See biographies by E. Checchi (1901) and C. Bellaigue (1911); also F. Werfel, *Verdi*, Eng. trans. 1926; F. Bonavia, *Verdi*, 1930.

Verdict. Incivil trials, the jury, after the judge has summed up the evidence, determine by their V. all issues of fact, and, if they find for the plaintiff, assess the damages. Damages are said to be 'liquidated' when the jury can arrive at the amount by mere arithmetic or calculate them according to a scale of charges or some other accepted rate or percentage (see *Odger's Principle of Pleading*). But when the amount is arrived at after consideration of all the circumstances, including the conduct of the parties, the damages are 'unliquidated.' In this latter case they may be *contemptuous*, when the jury think the plaintiff ought never to have brought his action; *nominal*, when, though the plaintiff was justified in suing, he has suffered no special damage, and has sued rather to clear his character or establish a right; *substantial*, when the plaintiff is entitled to fair compensation; and *vindictive*, when the jury desire to punish the defendant by making an example of him (this is permissible only in actions of breach of promise, libel, seduction, assault, malicious prosecution, false imprisonment, trespass, and slander). In criminal law Vs. are said to be either (1) general, i.e. guilty or not guilty; or (2) *partial*, i.e. guilty on one count (see *INDICTMENT*) and not guilty on the rest; or (3) *special*, i.e. where the jury find a certain state of facts and leave it to the judge to decide upon those facts whether the offence charged has been committed. In Scots law there is a middle V. of *non-proven*, but English jurisprudence has never favoured any rule that militates against finality one way or

the other in criminal trials. Where the jury cannot agree they must be discharged and the accused is then tried before a new jury. If a juror dies or is taken ill a similar result follows. Before a jury arrive at a V. they ought to satisfy themselves (a) that the facts are satisfactorily proved; and (b) that the circumstantial evidence (see *EVIDENCE*) is not only consistent with guilt, but is inconsistent with any other reasonable conclusion.

Verdigris, a poisonous pigment, consisting of basic copper acetates. It is used as a green or blue paint, and also in dye-works. The formula of common V. is roughly



Verditer, a basic copper carbonate obtained when sodium carbonate is added to a solution of copper sulphate. It is greenish blue in colour, but is little used as a pigment as it is very poisonous and liable to discoloration.

Verdun, a tn. and first-class fortress on the Meuse, in the dept. of Meuse, France. The cathedral of Notre Dame is not anct.; but the bishopric, the most famous occupant of which was St. Vanne (d. 525), goes back to the third century. It was here that the treaty authorising the threefold partition of the Frankish empire was signed in 843. Pop. (1926) 14,280.

Verdun, Battle of (1916). Began on Feb. 21, 1916, and continued, intermittently, until June 1916. (For the political considerations which decided the Ger. Gov. to endeavour, at all costs, to take Verdun, see *WAR, THE GREAT*.) The attack, in the first phase of this remarkable battle, or series of battles, was heralded by an artillery bombardment of quite exceptional intensity. So sustained and regular was this artillery fire that it was soon obvious that the Gers. intended literally to blast a path through Verdun. A few days later the Ger. infantry, in wave on wave, advanced up the slopes of Douaumont Hill (see *DOUAUMONT*) suffering extraordinary casualties from the famous Fr. 75s and mitrailleurs. There is no doubt that the Ger. High Command felt confident of success, for the Kaiser himself, on the evening of what was intended to be the supreme assault, watched the attack from a neighbouring eminence. The arrival, however, of General Pétain with timely reinforcements thwarted this plan and, the following day, a Fr. counter-attack was ordered which, in the result, changed the whole aspect of the attack. For days a tremendous battle was waged around the ruins of Fort Douaumont and by the first day of March the

Ger. attack slackened—a respite which enabled the Fr. to bring up ever more reinforcements and supplies. In the first phase of the struggle for Verdun, the Fr. had been called on to defend the heights of the Meuse; but, in the next phase, the struggle was transferred to the W. bank of the Meuse, the Ger. object being to remove the Fr. threat across the riv., so as to turn Douaumont by taking Pepper Ridge which, like Douaumont, lay in a commanding position to the N. of Verdun. The fiercest fighting raged round Mort Homme, the key of the position on the western bank of the riv., but, though the fighting continued throughout March and for many days in April, the Ger. effort, prodigal of man-power and of high-explosive shells alike, failed to gain the coveted city by a policy of sledge-hammer blows. Still undaunted, the Gers. at the end of May, launched the most desperate attacks on both sides of the riv. and, after a struggle of amazing intensity, during which General Nivelle vainly counter-attacked to regain Douaumont, the Gers. succeeded in capturing Fort Vaux, on June 7, and thus, at all events, had won two important positions of the exterior ring of the permanent fortifications. This, however, marked the limit of Ger. success, for the next important fort, Souville, was never reached, and the Fr. were never driven from the southern slopes of the Mort Homme hill, so that Verdun was saved, and all the Gers. had gained in return for the vast sacrifices made were a piece of territory N.E. of Verdun and less than 12 sq. m., two shattered forts, and some ruined villages. It is computed that the Ger. casualties were about 300,000. (For a detailed description of all the phases of the operations see under WAR, THE GREAT.)

Vere, Sir Aubrey de, see DE VERE, SIR AUBREY.

Vere, Aubrey Thomas de, see DE VERE, AUBREY THOMAS.

Vere, Sir Francis (1560–1609), an Eng. soldier, brought up by Sir William Browne. His whole life from 1585 to 1604 was engrossed in active service, chiefly in the Lowlands. He played a gallant part in the defence of Sluys (1587), the relief of Rheinberg (1589), the fights at Breda (1589) and Groningen (1594), the victories at Turnhout (1598) and Nieupoort (1600), and the defence of Ostend (1601–02). He also shared in the success of the Cadiz expedition (1596).

Vere, Horace, Baron Vere of Tilbury (1565–1635), an Eng. soldier, was brother to Sir Francis V. (q.v.). As

commander of the Eng. troops in Holland (1604) he recovered Sluys. In the Palatinate he was obliged to surrender to Tilly at Mannheim (1622).

Vere, Robert de, ninth Earl of Oxford (1362–92), an Eng. great chamberlain, one of the favourites of Richard II. Being charged with treason by the lords appellants (1387), he made a futile effort to raise the standard of revolt and eventually died abroad.

Vereshchagin, Vassili (1842–1904), a Russian painter, graduated from the naval school of St. Petersburg, but subsequently studied art in that city and in Paris. A restless spirit, he fought under Kauffmann during his Turkestan campaigns (1867), visited India, the Himalayas, and Tibet (1873), went through the Russo-Turkish War of 1877, travelled in Palestine and Syria (1884), was at the front during the Chino-Japanese War (1894), and finally perished with the flagship *Petropavlovsk* during the struggle between his country and Japan. His sensational pictures were designed to disgust people with warfare by confronting them with its horrors.

Verga, Giovanni (1840–1922), an Italian novelist, a native of Catania, Sicily. According to Mr. Richard Garnett, his books will in time to come be treasured 'among the most valuable documents for the social history' of that island. His *Novelle Rusticane* (1883) is the source of Mascagni's popular opera *Cavalleria Rusticana*; but his collections of short stories, *Vita dei campi* (1880) and *Medda* (1874), contain his finest sketches of the manners of Sicilian peasants, their savagery, humour, and passion for revenge. Many enjoy his novel entitled *Maestro Don Gesualdo* (1889), trans. into Eng. by D. H. Lawrence (1925), who pub. other translations from V.—*Little Novels of Sicily*, 1925, and *Cavalleria Rusticana and other Stories*, 1928.

Vergennes, Charles Gravier, Comte de (1717–87), a Fr. statesman, was equipped for the post of foreign minister (which he received on the accession of Louis XVI., 1774), by over twenty years' practice in diplomacy at the courts of Trier, Constantinople, and Stockholm. Hostility to England was his policy. Thus he spent more money than his country could afford in assisting the Americans in their War of Independence, and in 1777 recognised their new republic. He further gave his friendship to Austria and his support to Turkey, and at home was at daggers-drawn with Necker.

Vergil, see VIRGIL.

Vergil, Polydore, or 'De Castello' (c. 1470–c. 1555), an Italian writer,

spent the first and last years of his life in Urbino, his birthplace; but lived in England (1501-50), where he was at first employed collecting Peter's pence for Pope Alexander VI. He was appointed archdeacon of Wells in 1508 and prebend of Oxgate in St. Paul's in 1513. The twenty-six books of his *Historia Anglica* in Latin (1533), which closes with Henry VII., is still consulted as an authority, reprinted in Eng. for the Camden Soc. 1844-46. His *Proverbiorum Libellus* (1493) and his *De Rerum Inventoribus* (1499) deserve mention.

Vergniaud, Pierre Victorien (1753-93), a Fr. orator and revolutionist; dabbled in divinity, law, and commerce, before finally he found his true sphere of action, the National Assembly, whither he was sent in 1791. Here his impassioned yet reasoned eloquence led him to the leadership of the Girondists. The ominous speech of March 1792, in which he stooped to gloss over the excesses perpetrated at Avignon, fades away before that glorious oration of Dec. 1792, in which he urged an appeal to the people to decide the king's fate. With twenty-one fellow-Girondists he fell a victim to the Reign of Terror, and 'died unconquered, a philosopher and patriot.'

Verhaeren, Emile (1855-1916), famous Belgian poet: b. May 21, at Saint-Amand on the Escaut, E. Flanders; only son of Gustave V., a well-to-do retired draper. Educated: Jesuit College of St. Barbe, Ghent; Louvain University. Graduated in law, 1881; failed as a pleader in Brussels. One of a group of students affected by the vogue of Zola, he pub., 1883, *Les Flamandes*—a vol. of high-spirited poetry that shocked the respectable. A period of travel (including visits to London) was marked by: *Les Moines*, 1886; *Les Soirs*, 1887; *Les Débâcles*, 1888; and *Les Flambeaux Noirs*, 1890—the last three pathological. Recovering, he began to work the vein for which he is famous—realistic studies of modern life and labour; e.g.: *Les Campagnes Hallucinées*, 1893; *Les Villages Illusoires*, 1895; *Les Villes Tentaculaires*, 1895. In the same vein were: *Visages de la Vie*, 1899; *Les Forces Tumulueuses*, 1902; *La Multiple Splendour*, 1906. With his marriage came appeasement to his tortured soul. Poems of love shared, and poems of calm followed after life's storms; these are all in *Les Heures Claires* (1896), *Les Heures de l'Après-midi* (1905) and *Les Heures du Soir* (1911). *Love Poems* were trans. by F. S. Flint, 1916. *Les Aubes*, 1898, trans. into Eng. by A. Symons, is a not very successful drama, partly

in verse. The Great War drove him to England, where his writings frequently appeared in newspapers. In his last year appeared *Les Ailes Rouges de la Guerre*. He was accidentally killed at Rouen, Nov. 27. P. Mansell Jones's *Emile Verhaeren*, 1926, contains bibliography.

Veria, or **Verria**, see **BERGIA**.

Verjuice, or **Verges**, an acid liquor, expressed from crab apples. It is added to cider to give greater roughness and tartness, and in France is fermented and sweetened to make a favourite drink in rural dists.

Verkhne-Udinsk, chief tn. in the Buriat Mongolian Aut. S.S.R., Siberia. Pop. (1926) 23,918. Situated on the Trans-Siberian Railway.

Verkhoyansk, a vil. on the Upper Yana R., in the Yakut Aut. S.S.R., Siberia, Russia. The average winter temperature is -53.1°F. ; -79.5°F. has been observed. It is inhabited by Turkish-speaking Yakuts, and political exiles were also drafted here.

Verlaine, Paul (1844-96), a Fr. poet, b. at Metz. His lyrics are of the so-called impressionist type: half sensuous, half mystic, intensely beautiful in inspiration and subtle in rhythm, akin to the music of Debussy, who has set some of them, e.g. the *Fêtes Galantes*. His early paganism, responsible for such Baudelairean works as the *Fêtes Galantes* (1860, inspired by the paintings of Watteau) and *Poèmes Saturniens* (1866), was superseded by devout Catholicism, which came over V. during his imprisonment at Mons for shooting at the poet Rimbaud. *Sagesse* (1881) is on a level with the finest religious poems ever written. Other works: *Romanes sans Paroles*, 1874; *Jadis et Naguère*, 1884; *Amour*, 1888; *Bonheur*, 1891, etc. In every aspect he is the Villon of nineteenth-century Paris by his Bohemian life, his disolute habits, his alternations of piety and crime. He will always be notable as one who gave to Fr. poetry a new and original music and broke away from the stilted Alexandrine verse. At his greatest he ranks with Heine as one of the lyric singers who defies translation and imitation. See L. Lepelletier, *Paul Verlaine*, Eng. trans. 1909; H. Nicolson, *Paul Verlaine*, 1921. Life by Le Pelletier (Eng. trans.), 1900; Cazals and Le Rouge, *Les Derniers Jours de P. Verlaine*, 1923.

Vermeer, Jan Van, or **Van der Meer** (1632-75), Dutch painter, native of Delft. Little is known of his life. He married in 1652, and was admitted to the Guild of Painters of Delft. He probably studied under Karel Fabritius, a pupil of Rembrandt. In 1662 he was master of the

Guild, and again in 1670. He died at Delft, Dec. 13. After his death he was forgotten, his work being assigned to Peter de Hooch and others. He was 'discovered' in 1866 by the Fr. critic Théophile Thoré, who wrote under the name W. Bürger. V. is now recognised as the most perfect of the Dutch masters in point of technique. His greatest qualities are his capacity for careful design and his feeling for the play of light on colour, shown to perfection in his interiors. Forty-one pictures have been assigned to him. Of these the 'View of Delft' and the 'Head of a Girl' are in the Mauritshuis, The Hague; the 'Maid-servant Pouring Milk,' 'Woman Reading a Letter,' 'Street in Delft,' and 'The Letter' are in the Rijks Museum, Amsterdam; 'The Pianist,' and 'Young Woman at the Clavichord' are in the National Gallery, London; 'Music Lesson,' Windsor; 'Lady Writing a Letter,' Beit Collection, London; 'The Pearl Necklace,' Berlin; 'The Young Courtesan,' Dresden; 'The Geographer,' Frankfurt; 'The Artist in the Studio,' Czernin Collection, Vienna; 'The Lace Maker,' Louvre, Paris; 'The Woman with a Water Jug,' Metropolitan Museum, New York; 'Mistress and Servant,' Frick Collection, New York; 'The Girl with a Red Feather,' Mellon Collection, Washington; 'The Lady Weighing Gold,' Widener Collection, Philadelphia. See A. E. Gallatin, *Vermeer of Delft*, 1917; G. Vanzype, *Vermeer de Delft*, 1921; E. V. Lucas, *Vermeer of Delft*, 1922, and *Vermeer the Magical*, 1929.

Vermejo, see BERMEJO, RIO.

Vermicelli, a staple food in Italy, and is so-called because it consists of worm-like threads (from It. *vermicello*, a little worm), made from the granular meal of certain kinds of wheat.

Vermigli, Pietro Martire (1500-62), a Protestant theologian, was a native of Florence. He joined the order of Saint Augustine in 1516, and was eventually named visitor-general. He afterwards embraced the views of the Reformers; becoming, in 1542, theological professor at Strassburg. He then visited Cranmer in England, where he was made a professor at Oxford, but he returned to Strassburg during the persecutions in Mary's reign. His last post was that of professor of theology at Zürich. Some of his works are collected under the title *Loca Communes*, 1583.

Vermilion, the red variety of mercuric sulphide, HgS. It may be obtained by subliming the black sulphide formed by triturating mercury and sulphur together in a mortar. It is also prepared by digesting the

black amorphous sulphide for some hours in alkaline sulphides. V. is used as a pigment, but is commonly adulterated with ferric oxide and red lead. On heating it readily sublimes, and this constitutes a test of its purity. V. occurs naturally as the red mineral cinnabar.

Vermin, a general term for noxious animals, perhaps most commonly applied to rats and mice, but frequently used of the insect parasites of man.

Vermland, or Karlstad, a län in the S.W. of Sweden, lying to the N. of Lake Vener and adjoining Norway. Capital, Karlstad. Pop. 261,000.

Vermont, belongs to the New England group of the United States. It has an area of 9565 sq. m., and is remarkable in its group for having no seaboard. It is bounded on the N. by Canada, on the E. by New Hampshire, on the S. by Massachusetts, and on the W. by New York. Lake Champlain, about 100 m. long, forms part of the W. boundary. The name ('Verd Mont') has reference to the Green Mts. (highest peak, Mt. Mansfield, 4364 ft.), which traverse it from N. to S. First and foremost V. is an agricultural state, producing oats, maize, barley, hay, potatoes, and maple sugar. Its output of dairy products is the greatest in the U.S.A. It vies with Canada in the production of maple syrup and maple sugar, nearly 6,000,000 maple trees being tapped annually. It has probably the fewest people of colour of any state, its white pop. being 99.8 per cent. Illiteracy is only 2.2 per cent. V. was the first state admitted to the Union formed by the original states. The quarrying of marble, granite, and slate is the most profitable industry, and after that lumbering and timbering. Metal founding, flour milling, and the manufacture of hosiery, other woollen goods, and paper are also important. The cap., Montpelier, in 1930, had a pop. of 7837. Other tns.: Burlington, 24,789; Rutland, 17,315; Barre, 11,307. See W. H. Crockett, *History of Vermont*, 5 vols., 1921-23. Pop. 359,611.

Vermouth, an aromatic fortified wine prepared in France and Italy. The basis of the beverage is a white wine of tonic properties, which is flavoured by the maceration of bitter herbs and fortified by the addition of alcohol. Sometimes the wine is distilled, but more often whole wine and distillate are blended to the required alcoholic strength. Italian V. is more syrupy than French V.; both are esteemed as slightly tonic in addition to their alcoholic properties.

Vernation, the manner in which the

young rudimentary leaves of plants are arranged in the leaf buds. They may be conduplicate or folded along the midrib; convolute, when the whole leaf is rolled; valvate, when the leaves touch without overlapping; twisted or spiral, when they overlap in succession; and super-volute, when one leaf is rolled round another.

Verne, Jules (1828-1905), a French novelist, diversified his life at Amiens with frequent visits to Paris. He was an enthusiastic yachtsman and was



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THE MONUMENT AND TOMB OF JULES VERNE IN THE CEMETERY AT AMIENS

socially a great success. It was he who first popularised that species of romance in which all kinds of more or less plausible scientific discoveries are made the basis of the most extravagant and thrilling adventures. His best stories are a *Voyage Autour du Monde en Quatre-vingts Jours*, 1872; *Hector Servadac*, 1877, which is a narrative of life on a comet; *Cinq Semaines en Ballon*, 1862, his first success; and *Michael Strogoff*, 1880. See M. Allotte de la Fuye, *Jules Verne, sa vie et son œuvre*, 1928.

Verner's Law, a phonetic law relating to certain consonants in the

Indo-European family of languages, given to the world by the Danish philologist Karl Verner in 1875. Its discovery was the result of investigations intended to solve certain difficulties and irregularities left unexplained by Grimm's Law (*q.r.*). Grimm had said that Indo-European *p, t, k* became Low Ger. *f, th, h*. This was found not to be always the case. Verner explained this by reference to the primitive Indo-European accent. When the accent falls on the syllable before the consonant Grimm's Law holds good; but when it falls on the following syllable, *p, t, k* become continuant *þ, d, g*, later becoming stop *b, d, g* in most positions: e.g. Sansk. *bhrātār* (Gk. *ἑταίροι*) = Goth. *broþar*, New Eng. *brother*, with which cf. Sansk. *pītār* (Gk. *πατήρ*), Goth. *fadar*, Old High Ger. *fatar*, Old Eng. *fader*.

Vernet, the name of three Fr. painters:

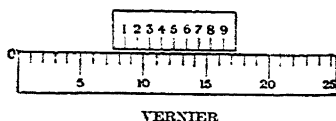
Claude Joseph Vernet (1714-89), b. in Avignon, lived over twenty years in Rome (1731-53) and passed the remainder of his life in Paris, whither he went at the bidding of Madame de Pompadour. Besides the sixteen pictures of French seaports—a commission of Louis XV.—he executed many landscapes.

Antoine Charles Horace Vernet (1758-1836), commonly called *Carle Vernet*, was a son of the above. He received a great shock during the Revolution by the death of a sister on the scaffold. His 'Triumph of Paulus Emilius' shows how much he had profited by his study of horses at riding schools and races. The 'Morning of Austerlitz' and the 'Battle of Marengo' are two of his finest works.

Emile Jean Horace Vernet (1789-1863), was a son of the above. Considering the Bohemian surroundings in which he thrived, his appointment as director of the French school of art in Rome was extraordinary (1828-35). In his 'Defence of the Barrier at Cléchy' and other war pictures is exhibited all the brilliance of improvisation.

Verney, Sir Edmund (1590-1642), an Eng. knight-marshal and standard-bearer, made 'some sallies out with my Lord Herbert and Sir Henry Wotton to see the Courts of France and Italy,' and in 1623 was a member of the suite which followed Prince Charles and Buckingham to Madrid. From 1624 he was a member of parliament, and when King Charles appointed him knight-marshal in 1626, the Marshalsea prison became his charge. He was killed at the battle of Edgehill, fighting for the king.

Vernier, a device invented by Pierre Vernier (c. 1580–1637) for reading the fractions of the smaller parts of a measuring scale. It is a scale which slides along the principal scale, and is divided so that n of its divisions corresponds to $n - 1$ or $n + 1$ divisions on the principal scale. It is used on all instruments which make linear or angular measurements, e.g. barometers, cathetometers, theodolites, sextants, telescopes, etc. Where n divisions correspond to $n + 1$ divisions on the sliding scale: suppose the principal scale to be divided into tenths of an inch; then nine divisions on the principal corresponding to ten on the sliding scale, each division on the V. is equal to nine-hundredths of an inch.



If the zero of the V. coincide with the division 10 of the principal scale, then the 10 of the V. coincides with the 19 of the principal. If the V. be moved so that its line 1 coincides with 11 of the scale, clearly then the V. has been moved through one-tenth of a scale division. Similarly, if 2 on the V. is made to coincide with 12 of the scale, the displacement of the V. is two-tenths of a division. Thus, to read the V., note the position of its zero and take the value of the nearest division, then look for the lines coinciding in V. and scale, and this gives the fraction of the division beyond the scale mark nearest 0. Thus in figure the V. 3 coincides with the scale 10 and the nearest division to the zero is 7, and since the scale is graduated in tenths the length from 0 on the scale to 0 on the V. is .73 in.

Vernon, a tn. in the dept of Eure, France, situated on the R. Seine. It manufs. chemicals and has stone quarries and mineral springs. Pop. (1926) 9725.

Vernon, Edward (1684–1757), an Eng. admiral, educated at Westminster school. He had already served at the siege of Gibraltar under Sir George Rooke (1704) and in the W. Indies and the Baltic, before the peace-loving Walpole at length gave him his coveted opportunity to assault Porto Bello. With the six ships he had demanded he captured this stronghold in 1739—an achievement celebrated in London with public fires. His subsequent attacks on Cartagena (1740) and Santiago de Cuba (1741) failed.

Verocchio, see **VERROCCHIO**.

Verona, a city on the Adige, 71 m. W. of Venice by rail, in the prov. of the same name and dept. of Venetia, Italy. The birthplace of Catullus, Vitruvius, Cornelius Nepos, Fra Giocondo (d. 1514), the architect of the fine tn. hall, Sanmichele (d. 1559), who designed many of the splendid Renaissance palaces, and Paul Veronese, V. is full of historic memories. The triumphal arch now called the Porta de' Borsari, a bridge, the huge amphitheatre, and some ornamental mosaic pavement recall Rom. times. The twelfth-century basilica of St. Zeno, the cathedral (consecrated in 1187), which contains the tomb of Pope Lucius III., and likewise the Dominican church of St. Anastasia (1261–1422), with its beautiful painting of St. George by Pisanello, are monuments of the Dark Ages. Finally, the fourteenth-century Scaligeri Palace, with its tall campanile and the exquisitely sculptured family tombs, reminds one of the tyranny of the della Scalas (1260–1375). A walled city and a stronghold in Rom. times, V. was fortified with its present circle of forts during the Austrian occupation (1797–1866), being then part of the great Quadrilateral. It has numerous manufs., and trades in wines, fruit, and marble. Pop. (1928) 151,707. See A. Wiel, *Verona* (Med. Town Series); A. M. Allen, *History of Verona*, 1925.

Veronal, known chemically as diethyl barbituric acid,



is a widely used hypnotic or sleep-producing drug. It is not very poisonous, though the sensibility of individuals towards it varies considerably, and it should be taken only under medical supervision. It is prepared by acting upon urea (q.v.) with diethylmalonic ester. See L. Lewin, *Phantastica*, 1931.

Veronese, Paul, whose real name was Paolo Caliari or Cagliari (1528–88), an Italian painter, a native of Verona. Studied under Antonio Badile, whose daughter he married. From 1555 onward he lived in Venice. His world-famous 'Marriage at Cana,' now in the Louvre, which was executed for the refectory of the convent of S. Giorgio Maggiore, is typical of his art; for he saw no incongruity in depicting the simple scene in Galilee with all the pomp and circumstance of the sumptuous Venetian life he loved, nor in representing Francis I. of France, Sultan Soleyman I., and Charles V. of Spain as associates of Christ. He revelled in gorgeous banquets, pageantry, and all the wealth

of colour, apparel, and furniture that the material world can offer. Apart from the fine 'Vision of St. Helena' (National Gallery), his best paintings and frescoes are in the church of San Sebastiano and the Villa Masiera (Venice). See F. P. Stearns, *Four Great Venetians*, 1901; P. H. Osmond, *Paolo Veronese: his Career and Work*, 1927.

Veronica, or **Speedwell**, a genus of herbs and shrubs (order Scrophulariaceæ), a number of which are British. The best known is brooklime (*V. beccabunda*). Several species are grown in garden beds and shrubberies, and they are valuable on poor soil.

Veronica, **St.** (corruption of the Lat. *vera icon*, 'true image'), the name given to the woman whom tradition speaks of as having wiped our Lord's face with a kerchief on the road to Calvary. The name was first given to the 'true image' of the holy face which was miraculously imprinted on the kerchief, but was later transferred to the woman herself.

Verrall, **Arthur Woolgar** (1851-1912), an Eng. classical scholar, brought a brilliant and original mind to bear on the most beaten track of learning, namely, the classics. In 1874 he was admitted a fellow of Trinity College, Cambridge, and from 1877 was associated with that university as one of its most stimulating professors. Many now accept the 'revolutionary' ideas expressed in *Euripides the Rationalist* (1895), whilst all students of Gk. know the value of his *Æschylean essays* and texts. His *Lectures on Dryden* were pub. 1914. See also *Collected Literary Essays*, with a memoir, and *Collected Studies in Greek and Latin Scholarship*, ed. by M. A. Bayfield and J. D. Duft, 1913.

Verres, **Gaius** (c. 120-43 B.C.). a Rom. proprætor of Sicily, notorious for his extortions and embezzlements. He first screened himself from prosecution by deserting Marius for Sulla, a more substantial protector; and secondly by betraying Dolabella, who in Cilicia was his abettor in venal practices. On his return from Sicily in 70, however, he had to stand his trial. Cicero brought such damning evidence against him that Hortensius, his counsel, refused to speak, and V. sought exile in Massilia.

Verri, **Alessandro**, **Count** (1741-1816), an Italian romancer, was a younger brother of Pietro (q.v.). His most famous work was *Le Notti Romane*, in which he imagines the spirits of anct. Roms. talking in the tombs of the Scipios.

Verri, **Pietro** (1728-97), an Italian historian, served in the Austrian army, and in 1765 became a member

of the Council of Economy in Milan. His chief works are: *Memorie sull' Economia Pubblica dello Stato di Milano* and *Meditazioni sull' Economia Politica*.

Verrio, **Antonio** (c. 1639-1707), an Italian painter, is described by Walpole as 'an excellent painter for the sort of subjects on which he was employed, that is, without much invention and with less taste.' Charles II. made over to him £5500 during the years 1676 to 1681, when he was employed decorating the ceilings and walls of Windsor Castle, and thought fit to introduce himself and Kneller in periwigs watching 'Christ healing the Sick.' He decorated the great staircase at Hampton Court.

Verrius Flaccus, a Rom. grammarian of the time of Augustus, who appointed him instructor to his grandsons, Caius and Lucius. He d. under Tiberius. Flaccus was the author of several grammatical works of which we still possess numerous fragments, including the *Fasti Prænestini*, and the abridgment of his work, *De Verborum Significatione*.

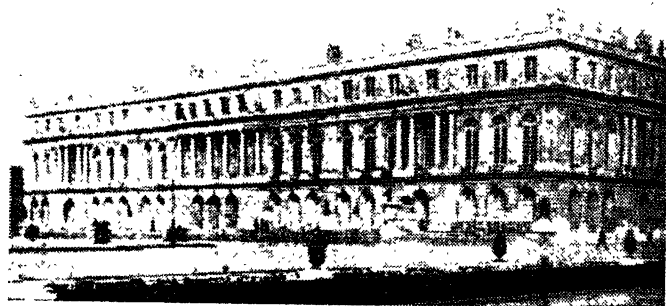
Verrocchio, **Andrea del** (1435-88), real name Clone, an Italian artist, was 'goldsmith, master of perspective, sculptor, carver, painter, and musician' according to Vasari. The only authentic painting of his is the somewhat hard but forcible 'Baptism of Christ,' now in Florence, but it is of interest to note that both Lorenzo di Credi and the great Leonardo worked in his studio. As a sculptor his renown has a sure foundation in the magnificent equestrian statue in bronze of Bartolomeo Colleoni, which now adorns a piazza of Venice. This was cast from Verrocchio's model by Leopardi and unveiled in 1496. See H. Mackowsky, *Verrocchio*, 1901; M. Cruttwell, *Verrocchio*, 1904.

Versailles, a tn. in France, about 10 m. S.W. of Paris. Its inhabitants number some 60,000, and the place is chiefly notable on account of its palace. This consisted originally of a château, erected by Louis XIII.; but in 1670 Louis XIV. conceived the idea of augmenting the building, and he commissioned the architect Le Van, who was succeeded anon by Mansart, who in turn was followed by De Côté; while the gardens were designed by Le Nôtre, and the decoration of the interior was supervised by Le Brun. Louis XV. lived frequently at the palace, and since then it has been the scene of many historic events. Here, in 1783, Britain recognised the independence of her American colonies; while it was here again in 1871 that the capitulation of Paris was signed. See also VER-

SAILES TREATY (1919). Prior to this V. had been turned into a public museum, and it contains a great array of pictures done in Napoleon's time; notably some by Louis David, and others by Isabey, Vernet, and Gros. See Nolhard, *La Création de Versailles*, 1901; G. F. Bradby, *The Great Days of Versailles*, 1927; L. French and H. D. Eberlein, *The Smaller Houses and Gardens of Versailles, 1680-1815*, 1927; M. L. Gothein, *A History of Garden Art*, trans. W. P. Wright, 1928.

Versailles, Treaty of (1919), signed on June 28, 1919, and ratified Jan.

states represented were Belgium, Brazil, China, Greece, Poland, Portugal, Rumania, Yugoslavia (then known as Serbo-Croatia) and Czechoslovakia, besides various Central and S. American states and others; and of these China alone refused to sign the treaty. The draft was presented to the Ger. delegates on May 7; on June 22 the Ger. National Assembly at Weimar by a majority of 99 (237 against 138) voted in favour of acceptance, and on June 28 the Ger. plenipotentiaries signed the treaty at Versailles. The original copy is deposited in the archives of the Fr. Republic.



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THE PALACE OF VERSAILLES FROM THE GARDENS

10, 1920. (For the history of the conference which discussed the terms of peace following the termination of hostilities in the Great War see PEACE CONFERENCE (1919).) The plenipotentiaries of the Allied and Associated Powers met in Jan. 1919 at Versailles to draw up the conditions of peace for the defeated Central Empires. These Powers were the United Kingdom (represented by D. Lloyd George, A. Bonar Law, Viscount Milner, A. J. Balfour, and G. N. Barnes); U.S.A. (Woodrow Wilson and Robert Lansing); France (Georges Clémenceau); Italy (V. E. Orlando); and Japan (Marquis Saionji). The British Oversea Dominions were also represented by: Canada (Sir G. Foster and C. J. Doherty); Australia (W. M. Hughes and Sir J. Cook); S. Africa (General Botha and General Smuts); and New Zealand (W. F. Massey). The minor Allied

ARTICLES OF THE TREATY. *The League of Nations.*—In the forefront of the treaty were the clauses to establish the League of Nations and to provide for international action to preserve peace in the future by means of the Covenant of the League (see COVENANT OF THE LEAGUE OF NATIONS; LEAGUE OF NATIONS; see also INTERNATIONAL JUSTICE, PERMANENT COURT OF). The Monroe Doctrine (*q.v.*) is expressly excluded from the decisions of the League members. Provision is also made in these earlier articles for the administration of the ceded Ger. colonies and territories by mandatories of the League (see MANDATORY SYSTEM).

Surrendered Territories.—(i.) Alsace-Lorraine to France; (ii.) the greater part of the provs. of W. Prussia and Posen to Poland; (iii.) the greater part of Eastern Silesia and of E. Prussia to Poland; (iv.) a portion of

offence against international morality and the sanctity of peace' and made provision for a special tribunal to try him. But, apart from the fact that the Dutch Gov. could not and were not even expected to surrender their refugee, the ex-Kaiser, it is evident that so nebulous and controversial a charge could never have been seriously heard and the moral question of responsibility for the War is best left to the general opinion of mankind.

Reparations.—Germany accepted, under the treaty, responsibility for the loss and damage caused to the Allies by the War, and provision was made for assessing the amount of compensation to be paid by Germany in kind or money. Under the Financial Clauses the first charge upon the assets and revenues of the Ger. Empire was to be reparations, and up to May 1, 1921, Germany was forbidden to dispose of or export gold without the approval of the Reparation Commission (see DAVES PLAN; REPARATIONS; and YOUNG PLAN).

Miscellaneous.—There were also provisions relating to labour organisation, trade and economic conditions, e.g. Germany agreed to supply specific quantities of coal to the Allies and to protect Allied trade against unfair competition; aerial navigation; ports and waterways—the waterways of the Moselle, Oder, Elbe, Danube and Niemen were placed under international commissions; Ger. property in Allied countries was to be applied to meeting the claims of Allied citizens for debts or losses due to Ger. agency, war graves, etc. The whole treaty contains some 440 Articles, and the authentic text was presented to Parliament as Treaty Series No. 4 (1919). Cmd. 153. See Index to the Treaty of Peace between Allied and Associated Powers and Germany; Dr. E. J. Dillon, *The Peace Conference, 1919*; H. W. V. Temperley, *History of the Peace Conference, 1920-24*. See also under EUROPE.

Verse, a concourse of words so arranged as to give a metrical or rhythmical effect. 'V' is figuratively derived from the turning of the plough (from *vertère*, to turn), which produces a line or furrow. A V. is strictly 'a series of rhythmical syllables, divided by pauses and destined in script to occupy a single line.' In Eng. the word 'V.' is loosely used of metrical composition as opposed to prose; and the singular V., as well as the more correct Vs., is used of a collection of several lines of poetry. The Gks. and Roms. made their versification depend on the way in which long and short syllables suc-

ceed one another, that is, on quantity—whereas in modern languages rhythm is dependent on stress or accent. Definite combinations of syllables are called 'feet.' It is a convention in Eng. prosody to use the classical names for the various feet, this being made possible by the assumption that an accented syllable is equivalent to a long syllable, and unaccented to a short one. The following quotations exemplify the best-known feet:—

(1) spondee " " and dactyl " " "

(a) 'Ärmä vī | rūmquē cā | nō ||
Trō | jāē qūi | primūs āb | ōrīs'

N.B.—|| marks the 'caesura' or pause.

(b) English dactyls:
'Bird of the | wilderness |'

(2) iamb " " and trochee " "

(a) 'Thelá- | dy óf | Shalótt |'
(iambic)

(b) 'In the | middle, | léaps a |
fountain | (trochaic)

(3) anapest " " "

'As they roár | on the shóre |'

(4) amphibrach " " "

Flow gēntly | sweet Áfton. |

The most common Eng. V. forms are: (a) blank or unrhymed V.; (b) heroic couplet (rhymed); (c) the Spenserian stanza of nine lines closing with an Alexandrine; (d) octosyllabic V.; and (e) the sonnet of fourteen lines which Surrey introduced from Italy. An illustration of (a) is *Hamlet*; of (b) The Prologue to the *Canterbury Tales*; of (c) the *Faerie Queene*; of (d) *Marmion*; whilst Keats and Wordsworth are two of a host of sonneteers (e). Icelandic and Anglo-Saxon poetry relied on alliteration, section, and stress for its rhythm.

See J. B. Mayor, *Chapters on English Metre*, 1901; L. E. Kastner, *History of French Versification*, 1903; G. Saintsbury, *History of English Prosody*, 1906-10; H. G. Atkins, *History of German Versification*, 1923; E. Smith, *The Principles of English Metre*, 1923; E. Fogerty, *The Speaking of English Verse*, 1923; E. A. Sonnenschein, *What is Rhythm?* 1925; E. Hamer, *The Metres of English Poetry*, 1930; L. S. Harris, *The Nature of Poetry*, 1931.

Versecz, Virset, Vršac or Varsat, a tn. of Yugoslavia, on the Rumanian frontier, formerly in Hungary. It has Rom. remains. The chief products are wine and brandy. Pop. 27,000.

Verst, a Russian linear measure equivalent to 1166½ Eng. yards.

Verstegan, Richard (d. c. 1635), an Eng. author and printer, was the son of a cooper of Dutch origin, and at Oxford became learned in Anglo-Saxon. Copper-plate engravings il-

illustrating the execution of the Catholic martyrs, and taken from the author's own designs, give a curious interest to his *Theatrum Crudelitatum Hæreticorum*, 1604.

Vertebrates, or Backboned Animals, form a division of the animal kingdom which includes not only man and animals of similar structure (mammals), but also fishes, amphibians, reptiles, and birds. Vs. are characterised by the possession of a well-developed internal skeleton, and by forming breathing organs from the wall of the throat.

Vertigo, or giddiness, a sense of lack of equilibrium. It may be *aural*, connected with ear disturbances; or *ocular*, connected with eye disturbances; or *cerebral*, caused by disease or injury in the brain; or *gastric*, caused by digestive disturbances; or may be due to the introduction of toxic substances, such as alcohol, tobacco, etc., into the blood. The chief form of aural V. is that associated with Ménière's disease, which usually involves hæmorrhage into the labyrinth, leading to deafness and staggering. Ocular V. may be caused by squint or such experiences as looking from a height, observing rapidly-moving objects, etc. Bodily disease of a generally debilitating tendency is always liable to produce V., and the treatment should depend upon the causative influence.

Vertot, René Aubert (1655-1735), a Fr. historian, b. in Normandy. He was at first a member of the Capuchin order, then of the Premonstratensians. He gave up the religious life, however, and afterwards became a secular priest. His chief works are: *Histoire des Révolutions de Portugal*, 1689; *Histoire des Révolutions arrivées dans la Gouvernement de la République Romaine*, 1719.

Vertue, George (1684-1756), an Eng. engraver and antiquary, b. in London. He was a pupil of Michael van der Gucht, and afterwards was commissioned by Sir Godfrey Kneller to engrave many portraits. He also was a member of the Society of Antiquaries. The notes collected by him were used afterwards by Horace Walpole in his *Anecdotes of Painting in England*.

Verulam, Lord, see BACON, FRANCIS.

Verulamium, or Verolanium, was a British city of importance in the days of the Rom. occupation. It was situated, as remnants of its flint rubble walls indicate, in the near neighbourhood of St. Albans, the site being now Old Verulam. Excavations that have been going on periodically since 1929 have brought to light, among other things of interest, remains of Rom. buildings, including

much beautiful and well-preserved mosaic work.

Verus, Lucius Aurelius, joint-emperor of Rome with Marcus Aurelius, his brother by adoption, from A.D. 161 to 169.

Verviers, a tn. in the prov. of Liège, Belgium, one of the chief centres of the woollen industry. Pop. (1928) 41,576.

Vesalius, Andreas (1514-64), a Flemish anatomist, was the son of Emperor Maximilian's apothecary; and himself became in 1544 chief physician to Emperor Charles V., and later of Philip II. of Spain. Louvain and Paris were the scenes of his studies, whilst he was afterwards professor of anatomy at Pavia, Bologna (1543), and Pisa. Discovery after discovery followed his careful dissections of human bodies; and whilst his progress disgusted Fallopius and the whole pedantic tribe of contemporary anatomists, it enabled him the more freely to expose the deficiencies of Galen, their oracle. *De Corporis Humani Fabrica Libri Septem* (1543) is his *magnum opus*.

Vesicant, see BLISTER.

Vesicaria, a genus of cruciferous annuals and perennials with yellow flowers followed by bladder-like seed pods.

Vesoul, a tn. in the dept. of Haute-Saône, France. It produces emery paper, files, paper, and trades in agricultural produce. Pop. (1926) 10,859.

Vespasian, or Titus Flavius Vespasianus, Rom. emperor (A.D. 70-79), b. in Reate in the land of the Sabini, his father being a humble tax collector. He owed his rapid rise undoubtedly to his military genius; and it is interesting to note that in 43, as legatus legionis in Britain, he reduced the Isle of Wight. Nero disliked him, but could not dispense with his services; and thus V. was in Judea, where he had been sent in 66 to conquer the Jews, when tidings reached him of his proclamation as emperor (69). Vitellius, his rival for imperial honours, was defeated by Antonius Primus; and, largely owing to the support of Mucianus, V. was soon firmly established on the throne. A successful termination, the work of Cerealis, to the war with the Batavi (70); the reduction of N. Wales by Agricola (78), and the conversion of the kingdom of Commagene into a Rom. prov., are conspicuous in the foreign history of this reign; whilst at home may be noted the expulsion of the philosophers and the execution of Helvidius Priscus the Stoic (73), the execution of Julius Sabinus and his wife (79), the rebuilding of Rome, and the maintenance of

peace and order. In V.'s own character it is his simplicity and contempt for outward shows, his common sense, and his private avarice coupled with a public bounty, which impress. His two sons, Titus and Domitian, both succeeded him. See B. W. Henderson, *Five Roman Emperors*, 1927.

Vespers, see BREVIARY.

Vespers, the Sicilian, the name given to the famous insurrection which took place at Palermo on Mar. 31, 1282, and which ended in the massacre of all the Fr. (under Charles of Anjou) in the island, and the declaration of independence. The prime instigator of the revolution was Giovanni da Procida (q.v.), who had been preparing it for twelve years, but was not actually in Sicily when it took place. He was aided by Queen Constance of Altavilla, Peter III. of Aragon, and many other Ghibellines exiled from Sicily by Charles. One of the greatest events in the history of the time, its romantic story has inspired a tragedy by Delavigne (1817), and an opera by Verdi (1855). See Michele Amari, *Guerra del Vespro Siciliano*, 9th ed., 1886.

Vespucci, Amerigo (1451-1512), a navigator, was a native of Florence. He began his career at Seville as a merchant; but his interest in Columbus induced him to abandon this profession, and he set sail for the New World in 1499. He is the discoverer of All Saints' Bay, Brazil, and has given his name to the New World in spite of the success of Columbus, his predecessor. See C. E. Lester and A. Foster, *Life and Voyages of Vespucci*, 1846; *The Letters of Vespucci*, trans. for the Hakluyt Soc. by C. R. Markham, 1894; *Vespucci Reprints*, Princeton Univ. 1916; A. Magnaghi, *Amerigo Vespucci*, 1928.

Vesta, was the Rom. goddess of the hearth, corresponding to the Gk. goddess 'Hestia.' From Lavinium, whither Æneas had brought, from

Palatine and Capitoline hills. In this shrine her fires were kept burning by the Vestals, her virgin priestesses (q.v.). At the 'Vestalia,' which was celebrated on June 8, matrons walked barefooted to her temple, carrying homely dishes for sacrifice.

Vesta, a minor planet discovered in 1807 by Olbers of Bremen, was the fourth in order of discovery, and is the brightest, being the only one visible to the naked eye, and as bright as a 6th magnitude star. It has the greatest albedo, and a diameter of 250 m. (Bamond), 214 m. (Farley). Revolution is performed in 3.63 years at a mean distance of 219 million m.

Vestals, The, or Virgines Vestales, were the six priestesses of Vesta (q.v.), who maintained the ritual and worship of that goddess in her temple at Rome. They were chosen by lot from a list of twenty maidens of free and worthy parentage, selected by the pontifex. Their term of service was at least thirty years—the years of learning and initiation, ten years of actual ministration, and ten years for imparting their lore to neophytes. The violation of the vow of chastity was punishable by death, whilst a retribution followed if any virgin allowed the sacred fires to go out.

Vesteras, or Västervik, a tn. and the cap. of the län of Vestmanland, Sweden. It is an old tn., with a cathedral and an episcopal library. Pop. (1928) 29,578.

Västervik, or Västervik, a seaport in the län of Kalmar, Sweden, about 75 m. N. of Kalmar, situated on the Baltic Sea. Pop. (1928) 12,569.

Vestmanland, or Västmanland, a län of Sweden, W. of the gov. of Upsala. Cap., Vesterås. Area 2609 sq. m. Pop. (1928) 162,800.

Vestments, Sacred, have been worn by the priesthood from time immemorial. The regulations with regard to those of the Jewish priests were extremely minute, but in spite of apparent resemblances no connection can be traced between these and the Christian vestments. These last are no more than the ordinary dress of anct. times, which was retained by the clergy long after it had fallen out of ordinary use. The Mass vestments for a priest in the Western Church are: amice, alb, girdle, stole, maniple, chasuble. At other solemn services and in processions a cope is used. At choir offices and other occasions the clergy wear a surplice, sometimes in the Eng. Church with the addition of a scarf and university hood. A stole is worn in the administration of the sacraments. The garments in the Gk. Church differ somewhat from these. See articles on each vestment named.



IMAGE OF VESTA ON A DENARIUS

Troy, the sacred fire of V. as well as the Penates, her worship was introduced to Rome by Numa; and he erected her central place of worship, a small, round temple with a vaulted roof, in the Forum between the

Vestris, Lucia Elizabeth (*née* Bartolozzi) (1797-1856), an Eng. actress, married A. Vestris, an actor, 1813. Sang in Italian opera in London and Paris. Made a great success as Tilla in *The Siege of Belgrade*, 1820. Appeared in light opera and pantomime.

Vestry, that part of a parish church in which the vestments and other movable ornaments are kept. Since such parts of the church have generally been used for holding meetings of parishioners for parochial purposes, such meetings, duly convened, have also acquired the name of Vs. It is the duty of Vs. to provide funds for the maintenance of the edifice of the church, and the due administration of public worship, and to elect churchwardens. Their conduct is regulated by common law and by a succession of Acts.

Vesuvianite, see IDOCRASE.

Vesuvius, a volcano, 7½ m. E.S.E. of Naples, rising from the eastern shores of the Bay of Naples, Italy. Its height varies by a few hundred feet, but averages 4000 ft. Monte Somma, the Mons Summanus of the ancients, is a great semicircular girdle of cliff to N. and E., parted from the eruptive cone by the valley known as Atrio di Cavallo, and itself the remnant of a massive wall which once shut in the huge cone of prehistoric times. Lava, scorix, ashes, and pumice-stone are the fabric of the mountain, which during activity emits a large assortment of minerals, such as augite, magnetic iron, leucite, hornblende, and mica. The amazing fertility of its slopes, on which especially those grapes luxuriate from which the wine 'Lachrima Christi' is made, explains why for over twenty-five centuries V., in spite of its constant menace, has been the heart of a densely populated region. The historic records of the eruptions have induced geologists to treat V. as the great object-lesson on volcanoes, and in 1844, at the expense of the Neapolitan Gov., an observatory was established, to which the researches of Melloni, Palmieri, and Mattucci have given a European fame. The destruction on Aug. 24, A.D. 79, of the noble cities of Pompeii, Herculaneum, and Stabix, the tragic death of the elder Pliny, and the graphic description of the disaster by his nephew, an eye witness, have cast an unfading glamour over that historic eruption. During those of 472 and 1631 particles of dust alighted in Constantinople, and during the eruption of 512 some actually reached Tripoli. Other years of remarkable activity were 1794, 1822, 1855, 1871, 1906, and 1929, the volcano never having been totally quiescent since A.D. 79.

Consult F. A. Perrott, *Vesuvius Eruption of 1906* (Washington), 1924.

Veszprem, cap. of Veszprem co., Hungary, on the Séd, 69 m. S.W. of Budapest; has coal mines, iron works, and cattle markets. It has a castle, episcopal palace, and Gothic cathedral (sixteenth century). Pop. 17,492.

Vetch, or Tare (*Vicia sativa*), a leguminous annual plant, with trailing or climbing stems, compound pinnate leaves, and reddish-purple flowers. In agriculture two races, winter V. and spring V., are known. The former is hardy and is sown in autumn to produce spring fodder. Spring Vs., which are more delicate and make more rapid and luxuriant growth, are sown from Feb. onwards, and are cut for hay when in bloom. Other species of the genus, including the beautiful tufted V. (*V. cracca*), are common British plants.

Veterinary Science began in the Egyptian civilisation, and from the Egyptian's knowledge of the horse and its diseases the Gks. and the Romans learnt much. The Roman Vegetius (c. A.D. 300) left writings on the subject, which in the sixteenth and seventeenth centuries were much studied and stimulated interest in the science, especially in France, where the first veterinary college was established at Lyons in 1762, and the second at Alfort, near Paris, in 1766. A Frenchman, St. Bel, founded the Royal Veterinary College in London in 1790, and it was another Frenchman, Lioutard, who first established a college in New York. Liverpool, Edinburgh, Glasgow, and Dublin now each have colleges. In most countries the professional status of the veterinary surgeon is high and is protected by law. In Britain the Council of the Royal College of Veterinary Surgeons conducts professional examinations and grants degrees (M.R.C.V.S. and F.R.C.V.S.). Until 1881 the Highland and Agricultural Society granted veterinary certificates in Scotland, and holders of these were brought under the R.C.V.S. in 1900. With the increased attention to the eradication of disease from domesticated animals and the protection of public health, the services of the veterinary surgeon are in growing demand. All state departments of agriculture have their veterinary branches, and V. S. is included in the curriculum of agricultural colleges. In the British army regimental veterinary surgeons are incorporated in the Army Veterinary Corps, which has a school at Aldershot. The field of V. S. is extensive; a knowledge of animal anatomy and physiology is essential

for scientific treatment of animal diseases, injuries, and displacement of organs. Minor surgical operations are often essential to promote the health of animals, and castration is commonly performed on those reared especially for meat. Injuries and displacements may be due to awkward jumps and falls, and to tears on barbed wires and thorns. Diseases may be due to bacteria, animal and fungal parasites, filterable viruses, to poisoning, and to interference with glandular function. Prevention of transmission of contagious and infective diseases is of the utmost importance; this has been strikingly shown by the enormous losses due to the spread of foot-and-mouth disease during the early part of the twentieth century. V. S. is concerned also with the hygienic housing and care of animals; with such normal functions of the animal as sight, hearing, pregnancy and birth, and with the impairment of such functions. Modern medical treatment is based on the results of experimental work, and V. S. owes much to the research of bacteriologists, physiologists, and pathologists. See BACTERIA; HEREDITY; PARASITOLOGY; PATHOLOGY. Consult G. A. Banham and W. J. Young, *Veterinary Posology and Therapeutics*; Fleming, *Veterinary Obstetrics*; F. B. Hadley, *Principles of Veterinary Science*; W. B. Herms, *Medical and Veterinary Entomology*; G. C. Jorgensen, *Veterinary Diagnosis and Treatment*; B. F. Kaupp, *Animal Parasites*; R. A. Kelsner, *Manual of Veterinary Bacteriology*; R. G. Linton, *Animal Nutrition and Veterinary Diets*.

Veto, a term applied to the right of a king or other chief magistrate or officer to withhold his assent to the enactment of a law, or, generally, of one branch of the executive of a state to reject the bills, resolutions, or measures of other branches. The term originates in the power of the tribunes of the plebs of anct. Rome to declare their protest against any unlawful measure, which they did by pronouncing the word 'veto' (forbid). In Great Britain the power theoretically belongs to the crown (see CROWN). In the crown colonies the governor exercises the power (see COLONIAL GOVERNOR). In the British Oversea Dominions, the V. of the governor-general had fallen into desuetude even before the passing of the Statute of Westminster, 1931, and even before the status of the governor-general and of the state governor had been changed by the Imperial Conference (see on this COLONIAL GOVERNOR; COLONIAL LAW). The position to-day in this

respect is that the governor-general of a Dominion (i.e. Canada, Australia, S. Africa, and New Zealand) or the governor of a state is merely the king's representative and has no power of reservation, in other words, no power to V. a measure for 'repugnancy' within the meaning of the Colonial Laws Validity Act, 1865. The governor of an Australian state, however, has the right, in effect, to V. a measure which violates the written constitution of the state, and this right was exercised in 1931 by Sir Philip Game, Governor of New South Wales, in refusing the request of the Premier, Mr. Lang, to create a sufficient number of additional members in the Upper House or Legislative Council to ensure the passage of a Bill which was designed to abolish the Legislative Council. See also WESTMINSTER, STATUTE OF. In the U.S.A. the president can V. a measure of Congress; but, notwithstanding his V., the measure becomes law if subsequently carried by a two-thirds majority of each house. In Scots church history, the Veto Act was the name of an Act passed in 1835 by the General Assembly of the church, by which it was decreed that no one should be admitted a minister of any vacant church if a majority of the male heads of families should dissent. The decision of the Court of Session and the House of Lords that the Act was *ultra vires* led ultimately to the disruption of 1843.

Vetter, a lake of Sweden, connected with the Baltic Sea and Lake Vener by means of the Göta Canal. It is 75 m. long and just over 10 m. wide. Its picturesque shores and clear limpid waters make it one of the most beautiful lakes in Sweden. It is also dotted with islands, one of the chief being Visingsö.

Veuillot, Louis (1813-83), a Fr. journalist, b. at Boynes (Loiret). He edited the *Echo de Rouen* (1831), the *Charte de 1830* (1837), and *La Paix*. He returned to Paris from Rome (1838) a violent supporter of Ultramontanism, and as editor of the *Univers* upheld the claims of the church. He pub. *Mélanges Religieux, Historiques, Politiques et Littéraires*, 1857-76.

Vevey, a tourist resort in the canton of Vaud, Switzerland, situated on Lake Geneva. One of the chief buildings of interest is the church of St. Martin, in which is Ludlow's tomb. This tn. is also the scene of Rousseau's *Nouvelle Héloïse*. The chief manufs. are chocolate, watches, and infants' food. Pop. about 13,000.

Vexatious Indictments Acts. The object of these Acts is to prevent unwarrantable prosecutions. Prior to

the Act of 1859 private persons had an unlimited right to prefer an indictment to a grand jury without any previous inquiry into the truth of the accusation before justices in the police court. The above Acts provide that no indictment can be preferred for certain specified *misdeemeanours* (see CRIMINAL LAW), viz. perjury; subornation of perjury; conspiracy; false pretences; keeping a gambling or disorderly house; indecent assault; misdemeanours under the Debtors Act, 1869, and the Bankruptcy Act, 1914; libel and other offences under the Newspaper Libel and Registration Act, 1881; misdemeanours under the Criminal Law Amendment Act, 1885; and indictable offences under the Merchandise Marks (*q.v.*) Act, 1887, unless (a) the prosecutor has been bound by recognisance to prosecute or give evidence against the accused; or (b) the accused has been committed to or detained in custody or bound by recognisance to appear; or (c) unless the indictment has been preferred by the direction or with the consent in writing of a high court judge or a law officer of the crown; or (d) in the case of an indictment for perjury, the prosecution is by direction of a court, judge, or public functionary authorised by statute to direct such a prosecution. By the Vexatious Indictments Act, 1867, if the prosecutor chooses to be bound over to prosecute, a course open to him if justices refuse to commit, he may be condemned in costs unless he secures a conviction. The Act of 1859 was (and still is) an important Act because, as stated above, it restricted the right theretofore possessed by any person to prefer a bill of indictment without any preliminary investigation before justices; but in the case of offences covered by the Act, the preliminary inquiry is necessary unless the prosecution is authorised in the manner provided by the Act (sect. 1). But in practice the presentation of 'voluntary' bills, even where it is theoretically permissible, is comparatively rare. In the Indictments Act, 1915, which amended and greatly simplified the system of criminal pleading, it is expressly provided that objection may nevertheless be taken to an indictment if it contravenes the provisions of the V. I. Act, 1859 (as amended)—a saving clause which goes to substance rather than to form.

Vexilla Regis, see HYMNS—Latin Hymnology.

Vézelay, a vill., which in mediæval times was a populous city, on the Cure, in Yonne, France. It is noted for its beautiful twelfth-century abbey church of St. Madeleine.

Viadana, Lodovico, or Lodovico Grossi (c. 1565–1645), an Italian composer, was a native of Viadana. After entering a religious order he held the post of choirmaster at Fano, Venice, and Mantua. He is usually considered to be the inventor of the *basso continuo*. See Life by A. Parazzi (Milan, 1876).

Viaduct, see BRIDGE.

Via Mala, a gorge in the canton of Grisons, Switzerland, the original road being made about the year 1470, and the present one during the first half of the nineteenth century. It is at the beginning of the Splügen road; is 4 m. long, and flanked by rocks about 1600 ft. high. It crosses the Rhine three times.

Vianna do Castello, a seaport of Portugal in Entre Minho-e-Douro. Pop. 47,096.

Viareggio, a seaport of Tuscany, Italy. It is a favourite resort and has shipbuilding yards and a school of navigation. Shelley was drowned near. Pop. 30,000.

Viatium (Lat. 'provision for a journey'), the communion administered to a dying person. It may be given daily when death is imminent.

Viatka, see VYATKA.

Viau (or Vaud), Théophile de (1590–1626), a Fr. poet, b. at Clairac. In 1616 he went to Paris and was attached to the household of the Duc de Montmorency. The publication (1619) of his *Cabinet Satirique*, with its strong Huguenot sentiments, forced him to leave Paris. He pretended to become a convert to Rom. Catholicism, but the publication of his *Parnasse Satirique* (1623) led to his arrest and condemnation to death, a sentence afterwards changed to banishment. He also pub. *Pyrame et Thisbé*, a tragedy (1623), and *Histoire Comique* (1621). His *Œuvres Complètes* (2 vols.) appeared in 1856.

Viaud, Louis Marie Julien, see LOTI, PIERRE.

Vibert, Jehan Georges (1840–1903), a Fr. genre painter, b. in Paris and educated at the Ecole des Beaux-Arts under Barrias and Picot. Among his paintings are: 'L'Appel après le Pillage'; 'Le Récit du Missionnaire'; 'L'Antichambre de Monseigneur'; 'Bailli de Suffren, for the Ministry of Marine'; the 'Annonciation'; and 'Mater Dolorosa, for the Palais de Justice. He also wrote the dramas: *Tribune Mécanique*; *Les Chapeaux*; and *Le Verglas*.

Viborg, or Vüpuril. (1) A gov. and its cap. in S.E. Finland. The gov. is in part plateau, and there are many lakes, including Lake Saima, which now communicates with the sea by Saima Canal. There are granite quarries

and iron works, but the soil is poor. Area 12,072 sq. m. Pop. (1928) 609,613. The tn., which lies at the head of Viborg Bay, in the Gulf of Finland, exports timber, iron, paper, butter, etc. The historic castle, erected in 1293, is one of many antiquities. There are machine shops and sawmills, besides foundries, but V. is better known as a tourist resort, the environments being most picturesque. Pop. (1928) 54,120. (2) An industrial and anct. city of Denmark, lies on Viborg Lake, in Jutland. Pop. (1925) 15,357.

Vibrio, a generic term for certain bacteria of spiral form.

Viburnum, a genus of deciduous and evergreen shrubs and trees (order Caprifoliaceae). *V. opulus*, the guelder rose, is an ornamental British shrub, with large white flower heads followed by pinkish berries which are eaten in parts of Europe. A variety of this is the snowball tree. *V. tinus* is the Laurustinus.

Vicar and Vicarage. A vicar is one who holds a benefice as deputy of the rector, who may be a layman. The rector, therefore, receives a share of the emoluments of the incumbency. The position occupied by the vicar is sometimes called a vicarage, but this term is more frequently applied to the vicar's residence.

Vice-Admiralty Courts. These are colonial courts exercising nearly the same jurisdiction as the High Court of Admiralty in England; but they are not courts of record (see RECORD). Such courts are established by the Admiralty by commission under the Great Seal, and may be abolished in the same manner. The jurisdiction of Vice-Admiralty Courts in India or other British possessions having a representative legislation extends only to questions respecting prize, the Foreign Enlistment Act, the navy, the slave trade, international law, and treaties or conventions. An appeal from decisions of these courts lies to the Judicial Committee of the Privy Council.

Vice-Consul, one who acts in the place of a consul. Vice-consular officers of the British Foreign Office are appointed in some cases by commission from the crown, in other cases by letter of authority of a superior consular officer.

Vicente, or Vincente, Gil (b. c. 1485), a Portuguese dramatist, wrote plays which were acted at the courts of Emmanuel and John III. In the earliest edition of his works (1562), his plays are divided into autos, that is, religious plays written chiefly for the celebration of Christmas; comedies, which are rambling, ill-constructed versions of novels after the type of

Gil Blas; tragi-comedies; and farces which are full of vivacity and merry humour, and undoubtedly contain V.'s best work. As he lived many years before Shakespeare and Lope de Vega, who undoubtedly modelled his dramas on G.'s work, he deservedly attained a European reputation. See *Four Plays* (1920) and *Lyrics* (1921), trans. by A. F. G. Bell; also E. Prestage, *Portuguese Drama in the 16th Century*, 1897; A. F. G. Bell, *Gil Vicente*, 1921.

Vicenza, a city, the cap. of Vicenza prov., Venetia, Italy, at the confluence of the Retrone and the Bacchiglione, 41 m. N.W. of Venice by rail; manufactures silk and woollen goods, leather, pottery, and musical instruments. Many of the fine buildings were designed by Palladio (d. 1580), a native of V. The Gothic cathedral dates from the thirteenth century. Pop. (1928) 66,967. The dist. of Sette Comuni in the N. of the prov. consists of Asiago, Enego, Foza, Gallio, Lusiana, Roana, and Rotzo, whose inhabitants speak a Ger. patois. Area of prov. 1046 sq. m. Pop. (1928) 548,802.

Vice-President, the next in rank to a president. As a rule the duties of a V. are necessarily nominal or dormant. In the U.S.A. the V. is he who automatically becomes president on the demise of the president during the latter's term of office. His chief duty is as presiding officer over the U.S. Senate. It is an anomaly that while he may automatically become President in case of the death of the latter, he has no seat in the Cabinet, and plays no part in the formation of policy. He only has a vote in the Senate in case of a tie.

Viceroy, one who rules over a kingdom or country in the name of the king with regal authority. The title so far as England is concerned seems to be confined to the V. of India. The king's representative in both Ireland and the Australian Commonwealth is styled governor-general.

Vichy-les-Bains (Lat. *Aquæ Calidæ*), a tn. of the dept. of Allier, France, on the Allier. It is a famous watering-place and its springs were known to the Romans. Pop. 17,500.

Vicia, see VETCH.

Vicious Intromission, see INTRO-MISSION.

Vickers, Ltd., registered 1911, was first registered in 1867 as Vickers Sons & Co., Ltd., when it took over the business of Naylor, Vickers & Co. In 1897, when the Naval Construction & Armaments Co., Ltd., and the Maxim-Nordenfellt Guns and Ammunition Co., Ltd., were taken over, the name of the firm was again changed, to Vickers Sons and Maxim, Ltd.

The company is a large shareholder in Vickers-Armstrong, Ltd.; the Eng. Steel Corporation, Ltd.; the Metropolitan-Cammell Carriage Wagon and Finance Co., Ltd.; the Airship Guarantee Co., Ltd.; Robert Bobey, Ltd.; Cooke, Troughton & Simms, Ltd.; Electric Holdings, Ltd.; Vickers (Aviation), Ltd.; Vickers Train Lighting Co., Ltd.; and the Ioco Rubber & Waterproofing Co., Ltd. By agreements with these companies V. is debarred from engaging in certain industries, including the manufacture of armaments, building warships, etc. Authorised share cap. 26½ millions. Offices: Vickers House, Broadway, Westminster.

Vicksburg, the co. seat of Warren co., Mississippi, U.S.A. It is an important cotton manufacturing centre and has also railroad shops, saw and lumber mills, canneries, and machinery works. The scene of an important siege and campaign of the Civil War, it contains the National Cemetery with more than 12,000 graves of unidentified soldiers, and the Vicksburg National Park of 1300 acs. on the site of the great battle-ground of 1863. Pop. (1930) 22,943.

Vico, Giovanni Battista (1668-1744), an Italian philosopher, historian, and jurist, b. at Naples, where he became professor of rhetoric in the university. In 1734 he was appointed historiographer to Charles III., King of Naples. His chief work is *Principi della Scienza Nuova d'Intorno alla Comune Natura delle Nazioni* (1725), of which Michelet pub. a Fr. translation, *Principes de la Philosophie d'Histoire* (1827). See Flint, *Vico*, 1885, and R. G. Collingwood's translation, *The Philosophy of Giovanni Battista*, 1913.

Victor, Claude Perrin, Duke of Belluno (1764-1841), a Fr. marshal, b. at La Marche (Vosges). He entered the army in 1782, distinguished himself at Toulon (1793), and became a brigadier-general. He commanded in the Italian campaigns of 1796-97 and 1799-1800, and won distinction at Marengo. He was captured by the Prussians (1807) and exchanged for Blücher. At Friedland he won the baton of a marshal and in 1808 was created Duc de Belluno. He took part in the campaigns in Russia, Germany, and France. He went over to the Bourbons, and was on the commission appointed to try those officers who deserted to Napoleon during the 'Hundred Days.' He was Minister of War (1821-23) and served in Spain.

Victor, Sextus Aurelius (fl. A.D. 370) a Rom. historian, was city prefect under Theodosius and possibly consul with Valentinian in A.D. 370. He is

claimed to be the author of a number of historical works.

Victor Amadeus, see SAVOY.

Victor Emmanuel I. (1759-1824), King of Sardinia (1802-21), b. at Turin. He commanded the Sardinian forces against the Fr. (1792-96), who occupied all the continental possessions of his family. The first Peace of Paris (1814) restored to him Piedmont, Savoy, and Nice, and the second (1815) restored Genoa. He abdicated in favour of his brother, Charles Albert, in 1821.

Victor Emmanuel II. (1820-78), King of Sardinia (1849-61) and of Italy (1861-78). He ascended the throne on his father's abdication after the defeat at Novara (March 23, 1849). Aided by his ministers, D'Azeglio and Cavour, and later by Garibaldi, Victor Emmanuel II. had created a new Italian kingdom by the end of 1860, and was proclaimed King of Italy (Feb. 26, 1861). In 1866 he wrested Venetia from Austria, and in 1870 occupied Rome. See ITALY. See also *Lives by Godkin* (1879) and *Dacey*.

Victor Emmanuel III., King of Italy, b. Nov. 11, 1869, at Naples; only son of King Humbert I. Ascended throne on assassination of his father, July 29, 1900. Entered army 1887; became lieutenant-general 1894 and commanding general at Naples 1897. Represented his father at the Russian court 1896, at the Victorian Jubilee 1897, and at Berlin, 1900. In 1896 he married Princess Elena of Montenegro. During Great War he lived, first, at the Villa Italia near Udine; and, after the Caporetto disaster, near Padua. Re-entered Rome, Nov. 14, 1918. The outstanding event in the post-war part of his reign was the *coup d'état* by the Fascisti, 1922.

Victoria, one of the states of the Commonwealth of Australia, situated at the S. of the continent, between the 34th and 39th parallels of S. latitude and the 141st and 150th meridians of E. longitude. It is bounded on the N. and N.E. by New S. Wales, from which it is separated by the Murray R., on the W. by S. Australia, and on the S. and S.E. by the Southern Ocean, Bass Strait, and the Pacific Ocean. The area, according to recent computation, is 87,884 sq. m., or only about one-thirty-fourth part of the whole continent, but the est. pop. on June 30, 1930, was 1,783,136 or 27.7 per cent. of the total Commonwealth pop. Chief tns. and pop. in 1929: Melbourne (cap.) 1,018,209; Geelong 43,580; Ballarat 42,200; Mordialloc 10,400; Warrnambool 8200; Hamilton 5320; Ararat 5300; Chelsea 7250; Castlemaine 7170; Bendigo 33,700; Wonthaggi 7000; Mildura 6100.

Physical Features.—The state is traversed with more or less regularity throughout its length from E. to W. by a chain of mountains and lesser hills, completely dividing it into two parts, and known as the Dividing Range. The summit of this range runs generally at a distance of 60 to 70 m. from the coast. The streams to the N. of it flow towards the Murray R. and those to the S. towards the sea. The eastern part of the range, dividing the Gippsland dist. from that of the Murray, is called the Australian Alps; and that part which separates the co. of Ripon from that of Borung is called the Pyrenees. Snow covers the higher peaks for several months of the year. The mountainous country is densely wooded to the summits with fine timber, but the peaks above the winter snow-line are bare or only partially covered with dwarfed trees or shrubs. For some 200 m. from Kilmore eastward the mountains are steep, but have been made accessible by good roads; westward from Kilmore the range rapidly dwindles and, though there are points of considerable height, such as Mt. William and Mt. Macedon, is easily crossed. That portion of the Murray basin commencing at Woolonga and extending in the form of a triangle to a width of 200 m. along the western boundary of the state is almost flat. The remaining country N. and S. of the Dividing Range and its spurs is undulating and in some parts destitute of timber, in others closely wooded. Besides the main Dividing Range, there are other ranges extending in different parts of the country, some of them being spurs of the main chain. V. has a climate far more congenial to Europeans than any other state in Australia. It is never severely oppressive, except during the prevalence of hot northerly winds, and these occur only at intervals in the summer. Over a series of years the mean temperature at Melbourne was 58.2°. Rain falls on the average upon 138 days in the year, the mean annual rainfall being 24.15 in. Droughts in V. are neither so general nor so continuous as in several of the other states; though, in certain dists., serious inconvenience and loss were experienced at times on account of deficient rainfall. The gov., therefore, promoted national irrigation schemes upon a large scale, and these are now under the administration of the State Rivers and Water Supply Commission. The capital expenditure on the irrigation works controlled by the Commission in 1929 amounted to over £12,500,000 and over £6,800,000 on waterworks.

Production and Industry.—The main industry is grazing and agriculture, over 8 million acs. being under cultivation in 1929-30. The chief products are wheat (3½ million acs.); oats (600,000 acs.); barley (97,000 acs.); potatoes and hay (850,000 acs.). In 1928-29 there were over 40,000 acs. devoted to the culture of the vine, producing about 2 million gallons of wine, 770,000 cwt. of raisins, and nearly 200,000 cwt. of currants. A large area is under orchards, and vegetables, tobacco, hops and olives are also grown. There is a large dairying industry (93,700,000 lb. of butter were produced in 1928-29, of which over 41,000,000 lb. were exported). Live-stock includes 1,300,000 head of cattle, 17½ million sheep and over 250,000 pigs. The wool exported overseas in 1928-29 amounted to 191,971,000 lb., valued at over £15,000,000. There are enormous deposits of brown coal and seams of true coal of good quality are being successfully worked. The chief exports, other than wool and gold, are grain and flour, butter, hides and skins, meats, live-stock, leather, milk and cream, and tallow. There is also a depot trade in wool, tea, textiles, timber, tobacco, and sugar. The chief imports are textiles and apparel, woollens, tea, timber, paper, oils, machines and machinery, and iron. Melbourne does 92 per cent. of the overseas trade; the other principal ports being Geelong, Portland, and Warrnambool. As a manufacturing country, V. is pre-eminent among the Australasian countries. The chief manufs. are: woollen mills, clothing, boots, etc.; metal, machinery; food, drink, and tobacco; coachbuilding; working in wood; bricks, stone and glass work; furniture; rubber goods, drugs and chemicals; tanning and fellmongering.

Communications.—Melbourne is connected with Sydney, Brisbane, Adelaide, and Perth by railway. Steam postal communication with England, via Ceylon and Suez, is maintained weekly. The railways in V., with the exception of two small lines, are all state-owned. The number of m. open for traffic in 1929 was 4709. There are over 14,000 m. of telegraph lines open, and over 155,000 telephones in use in the state.

Immigration.—See AUSTRALIA.—*Immigration.*

Education.—Education establishments in V. are of four classes: the university with four affiliated colleges, for superior education; state schools for primary and secondary education—the system of primary public instruction, which was commenced in

1873, is strictly secular and attendance at school is compulsory for children between the ages of six and fourteen, and state instruction is granted free of cost; registered schools, for primary and secondary education; and technical schools, for instruction in the various arts. The Melbourne University was established under a special Act of the Victorian Legislature in 1853; affiliated to it are Trinity, Ormond, Queen's, and Newman Colleges, connected with the Church of England, Presbyterian, Methodist, and Rom. Catholic Churches respectively. The technical schools number twenty-nine, and there are also two agricultural colleges and a school of horticulture. The principal technical school is the Melbourne Working Men's College, which is open to women as well as men. The secondary schools are mostly under the control of private persons or proprietary bodies.

Government.—The gov. of V. consists of a governor appointed by the crown, a Legislative Council or Upper House of thirty-four members, and an Assembly or Lower House of sixty-five members. The Constitution was established by an Act of the Victorian Legislature of 1854. The Adult Suffrage Act of 1908 placed women on an equality with men as electors. A very complete system of local self-gov. exists in V. The municipalities are either cities, tns. or bors., or shires. Each dist. is a body corporate with a common seal. In 1929-30 there were fifty-six cities, tns. and bors., and 140 shires.

Early History.—Captain Cook and the officers and crew of the *Endeavour* were, probably, the first Europeans to sight the country, though no landing was attempted. On his report that the eastern part of Australia was suitable for colonisation, a party of convicts was sent out in 1785 under Captain Arthur Philip, R.N., and on the shores of Port Jackson, N. of Botany Bay, Philip established a permanent settlement. No further exploration, however, was undertaken until George Bass, a naval surgeon, coasted Gippsland in a whaler and landed at Western Port on June 4, 1798. Port Philip Bay was first entered in 1802 by Lieutenant John Murray of the armed brig *Lady Nelson*. Later, two explorers, Hume and Hovell, travelled overland from Sydney, and the outcome of their report was that a convict establishment was founded on Western Port Bay. This settlement was soon abandoned and the first permanent settlement in V. was formed at Portland Bay by Edward Henty from Van Diemen's Land (Tasmania), who landed on

Nov. 19, 1834, and thereafter began agricultural and stock-breeding operations and also whaling. Other settlers followed, but no marked development ensued in this vicinity, owing to the want of good land and of safe harbourage. The cap. was founded by two Tasmanian parties, one led by John Batman, who landed on May 29, 1835, the other by John Pascoe Fawkner, who reached the site of Melbourne on Aug. 28, of the same year. Others from the same island and from Sydney followed, bringing stock with them, and penetrated further into the interior. Among these was Major (later Lieutenant-Colonel Sir) Thomas Mitchell, who was so impressed with the economic potentialities of the country, the greater part of which was still unknown, that he named it Australia Felix. His reports, coupled with the success of the earliest settlers, stimulated the interest of existing Australian settlers and of the mother country and one immediate result was that large herds of sheep and cattle were driven overland from New S. Wales to occupy the best pasture land in V., and shiploads of emigrants began to arrive from the United Kingdom. Regular gov. was first established under Captain William Lonsdale, who was sent from Sydney to take control, and landed on Sept. 29, 1839. On March 2, 1840, Sir Richard Bourke, the Governor of New S. Wales, visited it and named the cap. Melbourne. Charles La Trobe was appointed superintendent, which title in 1851 was changed to that of lieutenant-governor, when the colony was separated from New S. Wales and named V. Gold was discovered soon afterwards and led to a further influx of pop., but the ensuing and oppressive mining regulations resulted in rioting on the Ballarat goldfield in 1854. A new Constitution giving responsible gov. to the colony was proclaimed on Nov. 23, 1855. Consult J. W. Gregory, *Geography of Victoria*, 1907; H. G. Turner, *History of the Colony of Victoria* (2 vols.), 1904; also Victorian Year Book, Colonial Office.

Victoria. (1) The cap. of British Columbia, has a fine situation on the S.E. of Vancouver Is. It is a well-built, pleasant city, with a cathedral, the provincial parliament buildings, a high school affiliated to McGill University in Montreal, a public library, a handsome park on Beacon Hill, and electric lighting and tramways. It has some important industries, but is essentially a social and residential centre. Esquimalt, the headquarters of the British Pacific squadron, with its excellent harbour and large dry dock, is 3 m. to the W. Pop.

(1930) 66,600. (2) A tn. on a gold-field near the Zimbabwe mines, in S. Rhodesia. Pop. (white) 810. (3) A seaport shipping coffee, cocoa, etc., and manganese, 400 m. N.E. of Rio de Janeiro, the cap. of Espírito Santo, Brazil. Pop. about 20,000. (4) A tn. with a commerce in cereals, coffee, and sugar, 40 m. W.S.W. of Caracas in Venezuela. Pop. about 12,000. (5) A vil., 118 m. S.E. of Concepcion by rail in the prov. of Cautin, Chile. Pop. 7180. (6) The chief city and port, manufacturing cotton, sugar, and vermilion, in the British island of Hong-Kong. Pop. (1927, including Peak) 550,000. (7) The cap. of Labuan Is., Malay Archipelago. Pop. about 1500.

'Victoria,' a British ironclad, was launched in 1887. Whilst engaged in manœuvres off Tripoli on the coast of Syria, she was rammed by the *Camperdown*, and sank in a few minutes with the admiral, Sir George Tryon, and 358 of her crew (June 22, 1893).

Victoria (1819-1901), Queen of Great Britain and Ireland, Empress of India. Daughter of the Duke of Kent, a son of George III., she succeeded her uncle William IV. in 1837. Her succession to the throne separated the thrones of Hanover and Great Britain, which had been held by British sovereigns since the accession of George I. Her reign opened somewhat inauspiciously. Canada was in revolt, but by 1839 was united and granted a constitution. But at home more troubles prevailed, the Chartists were at the height of their power and small riots were breaking out in many parts of the country. Melbourne, the queen's first Prime Minister, was compelled to resign in 1839, but the bed-chamber question prevented the constitutional succession of Sir Robert Peel. In 1841 Peel, however, became Prime Minister, and many important measures were passed. In the meantime (1840) the queen had married her cousin, Prince Albert of Saxe-Coburg. The ministry of Peel (1841-46) witnessed many stirring episodes and events. War broke out in Afghanistan and with the Sikhs, the latter war ultimately resulting in the annexation of the Punjab in 1849. The Tractarian movement, which had made a great stir in religious circles, culminated in 1845 in the secession of Newman to Rome. In the same year the importance of some revision of the Corn Laws became obvious. Peel, the head of the Protectionist party, had his hand practically forced by the potato famine in Ireland, and in 1846, after having resigned and been compelled to resume office,

repealed the Corn Laws, and in so doing smashed the Tory party, who went into the wilderness to be educated by the future leader, Disraeli. The next ten to fifteen years were occupied chiefly with foreign affairs, which were directed chiefly by Palmerston. His policy and his independence did not appeal either to the queen or to the Prince Consort. The royal policy was reflected in the exhibition which was held in 1851, the Palmerstonian policy in the glee with which he hailed the revolutions of 1848. In 1851 Palmerston was forced to resign, since he had sent despatches congratulating Louis Philippe on the *coup d'état* without having the sanction of his sovereign. In 1854 the Crimean War broke out, and in 1855 Palmerston was returned to office and concluded the war in the following year. Still, relations with the queen were not of the best, and the direction of the Indian Mutiny by the gov. did not always fall in with the wishes of the queen. The Conspiracy Bill, a palpable attempt to conciliate Louis Philippe, led to the downfall of Palmerston, but even yet the Tory party were not strong enough to hold the reins of gov. In 1859 Palmerston was again in power in spite of Lord Derby's attempt to hold the Conservatives in office. In 1861 the Civil War in America broke out, and caused a great famine in Lancashire. Public sympathy was, on the whole, on the side of the S., and the escape of the *Alabama* was received with general rejoicings, although later it cost this country a very considerable sum (£3,250,000). The next decade witnessed a great change in the political life of the country. To a very great extent the death of the Prince Consort (1861) and of Lord Palmerston (1865) marks a distinct division in the reign of the queen. The accession to power of Disraeli in 1868, and of Gladstone in the same year, changed the politics of England. From 1832 to 1868, the Whigs had been almost continually in power, relying for support upon the middle classes, who had been enfranchised by the Reform Act of 1832. The accession to power of Disraeli marks the beginning of Conservative power, i.e. a Tory party who realised the conservative tendencies of the lower middle classes, sought to enfranchise them, and were prepared to move with the times; the accession to power of Gladstone marks the beginning of a Liberal party who were more progressive and, for want of a better word, more radical than their Whig forbears. Disraeli succeeded to power in 1868, but the time of the

Conservatives had not yet come; he was defeated on the question of the disestablishment of the Church in Ireland, and Gladstone succeeded. He was in power between the years 1868-74. During that period many sweeping measures were introduced and passed; the Irish Church was disestablished, an Irish Land Act, an Elementary Education Act, a Ballot Act, and a Judicature Act were passed, and purchase was abolished in the army. All these measures, although good, were startling, and in the sight of many old Tories almost revolutionary. The queen did not view them all with pleasure, and, indeed, was held to object to some of them. In 1874, however, the dissolution was succeeded by a Conservative gov., and Disraeli became for the first time *really* a Prime Minister with power. The keynote of Disraeli's policy may be called Imperialism, called by his political opponents 'jingoism.' In 1875 he bought up the greater number of the Suez Canal shares, which proved of overwhelming importance in the pursuance of our Egyptian policy at a later date. In 1876 the queen adopted the title of Empress of India, India having become a crown colony after the suppression of the Mutiny. The policy of Disraeli (or Beaconsfield as he then was, having accepted an earldom in 1876) in the Near East was bitterly attacked by Gladstone, but the Congress of Berlin, followed by the Treaty of Berlin in 1878, was supported by the greater part of the inhabitants of Great Britain. In 1879 the Zulu War was brought to a successful close, and in the same year the celebrated Midlothian campaign brought to an end the Conservative gov. The Liberals were returned to power with a large majority, and Gladstone became premier for the second time. In 1881 the Boer War and the defeat of Colley at Majuba was followed by the granting of independence to the Boers. British supremacy in Egypt was established by the battle of Tel-el-Kebir (1882), but the attempt to evacuate the Sudan was not so fortunate, and Gordon was killed at Khartoum before the relieving party could reach him. The affair created much feeling in the country at the time, but there seems little doubt now that Gordon reversed the policy of evacuation when he landed in Egypt. Ireland had been a source of constant trouble, and the Irish Land League was persistent in its demands for Home Rule. The disorder culminated in the Phoenix Park murders in 1882. This was followed by a Crimes Act, which for a time restored order. In 1885 Salisbury formed a ministry

which, however, lasted only six months, at the end of which Gladstone again returned to power. He had determined that the policy of coercion must cease in Ireland, and introduced a Home Rule Bill, which split the Liberal party, who were defeated. Salisbury's second administration was formed in July 1886, and lasted until 1892. In 1887 the queen celebrated her Jubilee. Attempts were made to promote order in Ireland, free education was established, and county councils set up. During this administration the Liberal dissentients from Home Rule, called Liberal Unionists, generally supported the Conservatives. In 1892 Gladstone became premier for the fourth time, and introduced a second Home Rule Bill. This was defeated in the Lords, and Gladstone retired from leadership and politics. He was succeeded by Rosebery, who was defeated in 1895 on the 'cordite vote,' and the Conservatives and Unionists as a coalition returned to power. Salisbury became premier for the third time. This ministry witnessed the Jameson raid (1896), the advance into the Sudan and the quarrel with the Fr. in the matter of Fashoda, which nearly led to war. In 1899 the trouble with the Boers in South Africa, which had been acute since 1896, resulted in the outbreak of the South African War. In 1900 the Australian Commonwealth Bill was passed, and the Boxer massacres led to international intervention in China. In the January of the next year Queen Victoria died. She had celebrated her Diamond Jubilee in 1897, and had reigned for a longer period than any previous sovereign. She had shown herself, on the whole, a constitutional monarch, but one with a keen insight into her own prerogative. Throughout the empire she was known and loved, and in the latter years of her reign was a most popular sovereign. See Lee, *Life of Queen Victoria*, 1904; Lytton Strachey, *Queen Victoria*, 1921; *The Letters of Queen Victoria: A Selection from Her Majesty's Correspondence and Journal, First Series, 1837-61*, ed. A. C. Benson and Viscount Esher, 1907; *Second and Third Series, 1862-1901*, ed. G. E. Buckle, 1926-31.

Victoria, Eugénie Julia Ena (b. 1887), ex-Queen of Spain, the only daughter of Prince Henry Maurice of Battenberg and the Princess Beatrice. She married King Alphonso XIII. of Spain in 1906, but was compelled to flee in the revolution of 1931.

Victoria, Lake, or Zor-kul, or Sarykul, lies at an altitude of 13,400 ft. on the Great Pamir, in Ferghana, Russian Turkestan, Central Asia. It is a vestige, gradually diminishing in

size, of a prehistoric period of glaciation, and is probably not the true source of the Oxus.

Victoria Cave, situated 1½ m. N.E. of Settle in Yorkshire, 900 ft. above the Ribble, and 1450 ft. above the sea. Romano-Celtic antiquities, including coins, pottery, and bronze ornaments and implements, were discovered in the uppermost layer, and in a lower the bones of the elephant, hyæna, rhinoceros, and bear. It was first explored in 1837.

Victoria Cross, a special decoration which can be conferred on officers or men of the army or navy for some special deed of bravery. It was founded by Queen Victoria towards the conclusion of the Crimean War (1856). It consists of a Maltese cross made of bronze, bearing in the centre the royal crown surmounted by a lion, and with the scroll superscribed 'For Valour.' The winning of the V. C. carries with it a pension of £10 per annum, which can, under special circumstances, be made up to £50. The number of V. C. awards made during the Great War was 623. Of this number 173 were posthumous awards. The distribution was as follows: *Army—United Kingdom*: infantry (excluding Foot Guards regiments), 326 (98 posthumous); artillery, 24 (4 posthumous); Guards regiments, 24 (6 posthumous); administrative units, 23 (8 posthumous); air force, 15 (5 posthumous); cavalry, 8 (4 posthumous); chaplains, 3; tank corps, 2 (1 posthumous). *Dominions* (all arms): Australia, 62; Canada, 61; New Zealand, 11; South Africa, 4; total 138, of which 33 were posthumous. *Indian Army*: 15 (4 posthumous); *Royal Navy*: 45 (10 posthumous). A Royal Warrant of 1920 extends eligibility to women of military nursing services and to civilians of either sex when serving under naval, military, or air authorities.

Victoria Falls, The (native name *Mosi-oatunya*, 'smoke sounds there'), great waterfalls upon the R. Zambesi, in Rhodesia, Central Africa, 900 m. from the sea; discovered by Dr. Livingstone in 1855. Above the falls the riv. flows over a level stretch of basalt and is flat and broad, dotted with thickly wooded islands. At this point it is some 1860 yds. wide, and then drops over a chasm extending the whole breadth and varying from 250 to nearly 400 ft. Its course is impeded by an opposite wall, nearly as high, the water escaping through a channel of 100 ft. width through the 'Boiling Pot,' into the Grand Cañon, now spanned by a splendid bridge. Though only half the width of Niagara Falls, the V. F. are twice

as deep, and the force of the drop is so great that huge clouds of mist from the seething waters, visible for 20 m., hang perpetually over the chasm. The railway to Bulawayo was opened up in 1905, and the falls are also connected by rail with Cape Town (1642 m.). The V. F. and Transvaal Power Company, formed in 1906, utilises the falls to generate power for the Rand and, with the Rand Mines Power Supply Company, has developed a system of supply of electric energy and compressed air not excelled anywhere in the world. The source of energy is coal, over 1½ million tons being used annually. The maximum capacity of the generating sets is nearly 400,000 h.p., the total quantity of electrical energy delivered to consumers being well over 1500 million units. The falls however, remain unharnessed, though, with the development of the mineral resources of Northern Rhodesia, it is probable that power would be developed on the N. bank of the falls.

Victoria Land, named after Queen Victoria, was discovered in 1841 by Captain James Clark Ross. It is a region of the Antarctic lying between 180° and 150° E. long. Ross followed its margin as far as 78° 4' S. lat. Here are situated Mt. Erebus (volcanic) and Mt. Melbourne (8337 ft.).

Victorian Order, The Royal, see ORDERS OF KNIGHTHOOD.

Victoria Nyanza, or Lake Victoria (known formerly to the Arabs as Ukerewe), the largest lake of Africa. Area 26,828 sq. m.; 255 m. long and 155 m. broad; altitude, 3726 ft.; water is highest in July and lowest in Nov., the extreme range being 43½'. As a freshwater lake it is in size second to Lake Superior alone. Lake Victoria is situated on the equator and forms the chief reservoir of the Nile, which leaves the lake at Ripon Falls, at Jinja. The N. part lies in Uganda, the S. in Tanganyika Territory, and a small area in the W. of Kenya Colony. Kavirondo Bay, Speke Gulf, Mwansa Bay, and Emir Pasha Gulf are the chief inlets. There are numerous islands, the chief being the Sesse in the N.W., including Bukasa, Bugalla, Ukerewe, Ukara, Buvumo, Lolul, Rusunga, and Ugingo. Into the lake flow the Kagera, Katonga, Ruizi, Nzola, Mara, and many others, and its only outlet is the Nile. Mwansa is linked up with the Tanganyika Central Railway (Dar-es-Salaam to Kigoma) by a branch line (174 m.). There is also rail communication between Jinja and points on Lake Kioga. There are weekly steamship sailings to the larger ports and less frequent sailings to the Sesse Islands and minor ports from Entebbe.

There are motor roads from Entebbe and Kampala to Masaka (85 m. from Kampala); and from Masaka to Mbarara, Kabale and Simba. Bukoba (3749 ft.), on the W. side, has coffee plantations. Here landing facilities have recently been improved. In the early days of the Great War, hostilities took place near Bukoba and in the Ruanda prov.; but in 1916 Brig.-Gen. Crewe drove the Gers. from the lake and occupied Mwanza. The southern region of the lake was discovered by Speke in 1858 and the northern part in 1863. Stanley sailed round it in 1875 and 1889, and Baumann in 1892. Commander Whitehouse completed his survey of the coast and islands in 1906. Kisumu and Karungu in Kenya, Jinja, Kampala, and Entebbe in Uganda, and Bukoba, Mwanza and Musoma in Tanganyika are the chief ports upon it.

Victoria Regia, *Queen Victoria*, or *Royal Water Lily*, a magnificent aquatic plant (order Nymphaeaceae), native of S. American rivs. It has a thick, fleshy root stock, and huge tray-like leaves from 6 to 12 ft. in diameter, green above and purple or violet beneath. The flowers are very large and fragrant. It is grown in tanks in stovehouses.

Victoria University, The, Manchester, was founded in 1880. It was formed from the union of Owens College, University College, Liverpool, and Yorkshire College, Leeds. This constitution continued until 1903, when the university was reconstituted by Royal Charter, Owens College being incorporated with it by an Act of 1904. Leeds College was at the same time formed into a separate university. Most of the buildings, arranged in two quadrangles, have been erected in the past fifty years and are located in the city. V. U. has a regular course of study for its degrees, which embrace all branches of study. The physics laboratory was extended in 1930-31, as also was Ashburne Hall for women, and recently a Chair of Geography was instituted. In 1931 the full-time students numbered 2292, part-time 408, including 438 graduates. Publications: *The Victoria University of Manchester*; *Technology*; the *Circle* (a literary organ); *Medical School Gazette*, etc.

'*Victory*,' a British battleship, 2164 tons, launched at Chatham (May 7, 1765), flies the flag of the commander-in-chief at Portsmouth. She was the flagship of Howe at the relief of Gibraltar (1782), of Hood at Toulon (1793), and of Nelson at St. Vincent (1797) and Trafalgar (1805). The *Victory* is now at Portsmouth, where

it may be visited by the public. It is maintained in a state of preservation by the Victory Fund. A former *Victory* was flagship of Sir John Hawkyns at the defeat of the Spanish Armada (1588).

Victory Medal. The institution of this medal was decided upon by the Associated Powers in March 1919, the distribution of the decoration to be in such a manner that it could not be confused with a purely commemorative medal for all mobilised men. The name of the medal for all Allied countries is 'Victory Medal' and the ribbon is identical, consisting of two rainbows joined by red in the centre. It was also agreed that the medal should be made of bronze and that the design should be as nearly as possible identical for each nation. The general design is, for the obverse, a winged figure of Victory full length in the middle of the medal, and full face, the borders and background plain, without inscription or date; on the reverse no inscription but merely the words 'The Great War for Civilisation' (in the various languages). Subject to this general design it was left to each country to choose its own details. The design for Great Britain's medal was thrown open to competition and that chosen was by J. McMillan. It was decided that the V. M. obviates the interchange of medals between the Associated Powers. The V. M. was awarded to all officers and men who entered a theatre of war on the strength of any military unit. As regards the navy the definition 'all officers and men who had been afloat on duty' is analogous to the definition applied to military personnel. The number of awards made up to 1929 was 5,138,262.

Victualling, see **RATIONS**.

Vicuña, or *Vicugna* (*Auchenia vicuña*), a small ruminant, native of Bolivia and N. Chile. Its soft silky fur or wool is brown in colour, and much valued for the manuf. of choice fabrics. The V. is very wild, active, and surefooted, and is much hunted.

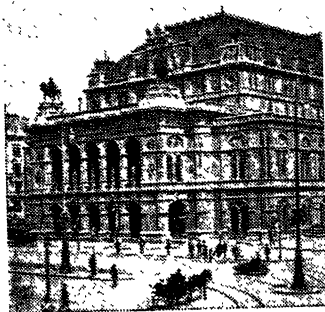
Vida, **Marco Girolamo** (1490-1566), a Latin poet, b. at Cremona. He became a canon of St. John Lateran at Rome; was appointed Prior of St. Silvester, Tivoli, by Pope Leo X., and Bishop of Alba by Clement VII. (1532). His chief poems are: *Christias*, 1535; *De Arte Poetica*, and *Scacchiae Lidas*. See *Life* by Lancetti, 1840.

Vidocq, **Eugène François** (1775-1857), a Fr. criminal and detective, b. at Arras. He engaged in a series of discreditable escapades, was for a time an acrobat, and served in the army. In 1796 he was convicted of forgery in Paris and sentenced to eight

years in the galleys. He escaped and in 1809 entered the secret police of Paris, and in 1812 was made chief of the 'Brigade de Sûreté.' In 1832 his private detective office was suppressed. His *Mémoires* (1829) are of doubtful authenticity.

Vieira, Antonio (1608-97), a Portuguese missionary, b. in Lisbon. He was educated by the Jesuits at Bahia, Brazil, and entered the order in 1625.

Vienna, the cap. of the Austrian Republic, and an autonomous federal prov., is situated among woods at the edge of a fertile plain near the low heights of the Weiner Wald. It lies on the r. b. of the Danube, an arm of which, since 1876 converted into a canal, intersects the tn. V. consists



[D. McLeish

THE OPERA HOUSE, VIENNA

of the interior or old city, and the suburbs. The old city is nearly circular, and not above 3 m. in circumference. It is surrounded by a broad fosse, and a wall from 40 to 50 ft. high, which has ten regular bastions, and forms altogether what is called the Bastel or Ringstrasse, now one of the most favourite promenades of V., commanding a very fine view. The inner or old city is very irregularly built; most of the streets are crooked and narrow. The old city is the most fashionable: it contains the former palaces of the emperor, and of many of the principal nobility, the public offices, the finest churches, state opera house, and most of the museums and art collections, which are very fine, the colleges, the exchange, and the most splendid shops. The public buildings, palaces, churches, etc., are

very numerous. The cathedral, dedicated to St. Stephen, is a beautiful Gothic structure. The Hofburg, the former imperial palace, is an old irregular edifice built at different times; it has been turned into offices, shops, etc., and its ballroom is a theatre. The modern part houses a library containing above 800,000 volumes and 16,000 manuscripts. The principal establishment for education is the university, founded by Duke Rudolph IV. in 1365. It was attended in 1926 by 9907 students, and had 853 professors; it has an extensive library, an observatory, a botanic garden, a veterinary school, and other appendages. V. is the seat of Protestant and Rom. Catholic archbishops. An important international fair is held here yearly. Though the Austrian dominions are now greatly diminished, V., which possesses over 28 per cent. of the total pop., has not suffered as greatly as was expected from lack of trade; it is still the chief commercial city of S.E. Europe. Although impoverished, V. is notable among the cities of Europe for its housing conditions and the municipal care of the populace. It has an important film industry, and a wide transit trade, and still exports great quantities of luxury goods. The principal manufs. are silk, velvet, shawls, gold and silver lace and ornaments, linen, cloth, furniture, chemicals, meerschaum pipes, ribbons, carpets, leather goods, porcelain, jewellery, mathematical, scientific, and musical instruments, watches, fine cutlery, gloves, lace, straw hats, paper, etc. The public promenades, which are the great places of resort for the citizens of V., are, besides the Bastel mentioned above, the Glacis, or esplanade between the city and the suburbs; the Volksgarten (the people's garden); the gardens of the palaces of Liechtenstein, Rasumowsky, Schwarzenberg, and the Belvedere; and the Prater, in the suburb Leopoldstadt, which is an immense park of 2000 acs., stretching to the Danube. Great lines of railway radiate from V., connecting it with the principal European cities. In Rom. times there was a station here named Vindobona; the city grew into being in the ninth and tenth centuries and became a place of importance under the Crusaders. In 1278 it became the Hapsburg cap. Pop. (1928 est.) 1,855,360. See J. Schwertfeger, *Vienna Gloriosa*, 1923; A. M. Williamson, *The Lure of Vienna*, 1926; Carl Toth, *Wien und der Wienerwald*, 1929.

Vienna, Congress of. A congress of European statesmen held in 1814 after Napoleon's exile to Elba, to

settle the peace of Europe. England was represented by Lord Castlereagh, who worthily upheld the cause of abstract justice against some of the Allied sovereigns. But before the deliberations of the congress had ended, Napoleon escaped from Elba and landed in France.

Vienne: (1) A dept. of W. Central France, formed in 1790 out of about four-fifths of Poitou, and of Touraine and Berry. It is situated between Indre on the E. and Deux-Sèvres on the W., and is divided into the five arrons. of Poitiers, Châtellerault, Civray, Loudun, and Montmorillon. Poitiers is the cap. Area 2711 sq. m. Pop. (1926) 310,474. (2) A tn. in the dept. of Isère, France, on the l. b. of the Rhone, 20 m. S. of Lyons. It has lead and copper mines, and manufs. of wool, silk, wines, etc. It is the anct. city of *Vienna*, chief tn. of the Allobroges. It has Rom. ramparts, a temple to Augustus and Livia, an amphitheatre and other interesting relics. Its cathedral dates from the twelfth century. Pop. (1926) 25,092.

Vienne, Haute-, see HAUTE-VIENNE.

Viersen, a tn., Rhine prov., Prussia, 10 m. W.S.W. of Crefeld; manufs. velvet, plush, silk, and damask, and has large coffee-roasting works. Pop. 32,000.

Vierzon, a tn., dept. of Cher, France, on the Cher; manufs. porcelain, glass, and agricultural implements. Pop. with V.-Villages and V.-Bourgneuf, 20,356 (1926).

Vieta, François, or Franciscus Vieta (1540-1603), a Fr. mathematician, one of the founders of modern algebra and was the first to formulate the principle of homogeneity. Whilst counsellor to the 'parlement' at Tours, he discovered how to read a Spanish cipher of more than 500 characters.

Vigan, a pueblo, Luzon Is., Philippines, cap. of Ilocos Sur prov., has fisheries, brick and tile kilns, and boat-building yards. Pop. 19,900.

Vigée-Le Brun, Marie Anne Elisabeth, see LEBRUN.

Vigevano, a tn., Pavia prov., Lombardy, Italy, on the Ticino; has a cathedral, also a trade in silk and numerous manufs. Pop. (com.) 23,800.

Vigfusson, Gudbrandr (1828-89), an Icelandic scholar, b. in Iceland, and graduated from Copenhagen University. In 1866 he settled down at Oxford, being appointed reader in Scandinavian in 1884. Besides editing classic Scandinavian poetry in the *Corpus Poeticum Boreale* (1883) and a number of Icelandic classics and sagas, including *Biskupa Sögur* (1858-78), the *Flateyjar-bók* (1860-68, with Unger), and the *Sturlunga Saga* (1878), he compiled, unaided, an *Icelandic-English Dictionary* (1866-73).

Vigil, in the modern church, the day of preparation before a great festival. In the early church the V. was the night before a festival, and was spent in watching and prayers.

Vigilance Committee, an unauthorised organisation of citizens in the U.S.A., who, in the absence of regular courts of law or by reason of their insufficiency, took urgent cases into their own hands and administered summary justice. These committees existed particularly in the S. and W.

Vigilance Societies. These are societies which exist for the protection of women and girls. Excellent work is done by the National Vigilance Association and International Bureau for the Suppression of Traffic in Women and Children, notably in making all inquiries as to the *bona fides* of advertisements of situations vacant. The agents of the association undertake to meet at railway stations women and girls who are searching for situations or paying visits to advertised berths. The Bureau has branches in all countries. The London Public Morality Council (established 1899) co-ordinates the efforts of other agencies concerned with checking prostitution. The Homes for Working Girls in London, and the various Girls' Friendly Societies also perform valuable vigilance work.

Vigilius, Pope (537-555). He was elected at the instance of Justinian, Emperor of the East, who had just deposed Sylverius on a charge of having corresponded with the Goths. He took a considerable part in the theological controversy known as the 'Three Chapters,' which 'chapters' he refused to condemn until after the Council of Constantinople.

Vigna, Pier della, or Petrus de Vineia (c. 1190-1249), an Italian statesman and jurist, b. at Capua. The emperor Frederick II. appointed him his chancellor, and V. defended him before the Council of Lyons in 1245. He was also legate to the papal and Eng. courts. He was later accused of conspiring against the emperor's life, and condemned to be blinded and imprisoned. His publications include *Letters*, valuable as a record of the history of the time; Latin and Italian poems, and *De Potestate Imperiali*. See Life by Huillard-Bréholle, 1864.

Vignola (Giacomo Barozzi, or Barocchi) (1507-73), an Italian architect, b. at Vignola, near Modena. Succeeded Michelangelo as the architect of St. Peter's, Rome, and designed the Escorial in Spain, and the palace of Cardinal Alexander Farnese at Caparola, near Viterbo.

Vigny, Alfred Victor, Comte de (1799-1863), a Fr. poet, b. at Loches (Indre-et-Loire). He came of a soldier family, and served in the army for twelve years. He pub. his first volume of poems in 1822, and four years later his famous prose romance *Cinq-Mars*, followed by *Poèmes Antiques et Modernes*. In 1832 appeared his drama of *Chatterton*, and amongst his other dramatic work may be mentioned: *Quitte pour la Peur* and *Shylock*, an adaptation of *The Merchant of Venice*. He left a volume of verse, entitled *Les Destinées* (1864), containing some fine poems, and *Journal d'un Poète* (1867). See *Lives* by Paléologue (1891), Asse (1895), and Lauvrière (1910); also Anatole France, *Alfred de Vigny*, 1923; P. Flottes, *La Pensée politique et Sociale d'Alfred de Vigny*, 1927.

Vigo, a seaport and fort. tn. of Spain, on the Rio de Vigo. It is a resort for sea-bathing, and has a wireless station. It has a deep and spacious harbour, and important sardine and other fisheries, and is a port of call of several steamship lines. Shipbuilding is also carried on, and there are tanneries, soap works, distilleries, flour and paper mills, and sugar refineries. The tn. was attacked by Drake towards the end of the sixteenth century, and in 1702 the allied Anglo-Dutch fleet sank the Fr. and Spanish ships in Vigo Bay and captured £1,000,000 from the Spanish treasure fleet from America. Pop. 53,100.

Vihara, see ARCHITECTURE—India.

Viipuri, see VIBORG.

Vikings, see NORSEMEN.

Vikramorvasi, see KALIDASA.

Villa, Francisco (i.e. Doroteo Orango; nickname 'Pancho') (?-1923), Mexican brigand. Birth-date variously given—1868-77. Born in state of Durango, of half-breed parents. Was a butcher in western Chihuahua. Took name of V. from a former bandit. Harassed rich landowners of northern Chihuahua. Joined Madero in revolt against Diaz, 1910. Pursued by U.S. troops for a raid on Columbus, New Mexico, March 1916; escaped. Fought for and against Carranza. In Aug. 1920, submitted to Huerta, at a price. Ambushed near Parral and shot dead, July 20.

Villach, a tn. of Austria on the Drave, in the prov. of Carinthia, with manufs. of lead, cement, colours, and chemicals. It is the centre of the wood trade with Italy. There are hot sulphur baths in the vicinity, and about 9 m. to the W. are the lead mines of Bleiberg. Here, in 1492, the Gers. gained a victory over the Turks. Pop. 22,100.

Villafranca: (1) A tn. in the prov.

of Verona, Italy. The peace preliminaries were signed here in 1859 by Napoleon III. and the Emperor Francis Joseph after the Battle of Solferino. Pop. 9700. (2) A tn. in Piedmont on the Po; famous for its silk industries. Pop. about 7300. (3) or Villefranche-sur-Mer, a fortified tn. and trading port of France in the dept. Alpes-Maritimes, on the Gulf of Nice. It is the station for the Fr. Mediterranean fleet in the winter, and has marble quarries. Pop. 3200.

Village Community, consisted in the Middle Ages of a number of families standing in a proprietary relation to a dist. divided into three parts. These three portions were: the mark of the township or village, the common mark or waste, and the arable mark or cultivated area. The community inhabited the village, held the common mark in mixed ownership, and cultivated the arable mark in lots appropriated to the several families. Each family was governed by its own head, who made law within his house and enforced it without, but he stood in a number of intricate relations to the other heads of families, so that the rights of one family over the common mark were controlled by the rights of every other family. Thus, when a householder felled wood or grazed cattle in the common forest an officer watched to see that the common domain was equally enjoyed. Again, in the arable mark, each householder had his own family lot in each of the three fields (the cultivated land of the Teutonic village community being invariably divided into three to get a rotation of crops), but he could not cultivate as he liked. He had to sow the same crop as the rest of the community and allow his lot in the uncultivated field to lie fallow with the others; i.e., he must do nothing to interfere with the right of the other households. See Maine, *Village Communities in the East and West*.

Villani, Giovanni (c. 1275-1348), an Italian chronicler, b. at Florence. He spent some time in travel, being engaged in commerce, and visited France and Flanders, following all the movements of the war between Philip the Fair and the Flemings. His great work, *Historie Fiorentine* or *Cronica Universale*, was suggested by a visit to Rome at the jubilee of 1300. This begins with biblical times and comes down to 1348, and is a general chronicle extending over the whole of Europe. It was continued by Matteo V., his brother, and Matteo's son, Filippo V., who take the chronicle down to 1364.

Villanovans, in archæology, a conventional term denoting certain

tribes of Italy of the early ages. See IRON AGE.

Villanueva de la Serena, a thriving tn. of W. Spain in the prov. of Badajoz, noted for its wine and fruit, especially melons. Pop. 15,000.

Villanueva-y-Geltru, a seaport on E. coast of Spain in the prov. of Barcelona, with manufs. of cotton, paper, lace, and soap. The Museo Balaguer contains a library with MSS. from monasteries, and painting, sculpture, and antiquities from Rome and Egypt. Pop. 14,000.

Villard, Fanny Garrison (1844-1928), American philanthropist and social reformer, b. at Boston, Mass., Dec. 16, daughter of William Lloyd Garrison (q.v.) and wife of Henry V., journalist and financier (d. 1900). She was one of the first women in the U.S.A. to take an active part in the women's suffrage movement, in which work she was associated with Mrs. Carrie Chapman Catt, Anna Shaw, and other leaders. Later, she devoted her time to the cause of international peace, and founded the Woman's Peace Society, and was active in many philanthropies in New York and elsewhere.

Villareal, a tn. in the prov. of Castellon, Spain, 4 m. S. of Castellon de la Plana. Pop. 16,700.

Villa Rica, a tn. in Paraguay, 75 m. E.S.E. of Asuncion. It is chiefly noted for the manufacture of tobacco. Pop. 26,000.

Villars, Claude Louis Hector, Duc de (1653-1734), a marshal of France, b. at Moulins. He served in the Dutch wars and also helped the Elector of Bavaria against the Turks, and in 1702 defeated the Margrave of Baden at Friedlingen. For this victory he was made a marshal, and in 1709 was sent to command the main army opposing Eugene and Marlborough on the N. frontier, but was wounded at Malplaquet. He was at the head of the last army France could raise, and saved his country by his victory at Denain (1712), when he fell upon the British and Dutch under Albemarle and drove Prince Eugene under the walls of Brussels, negotiating the Peace of Rastatt (1714). He played a conspicuous part in the politics of the regency period as the principal opponent of Cardinal Dubois, and took the field for the last time in the War of the Polish Succession (1734).

Villefranche, a tn. of France in the Rhône dept., on the Saône, noted for its cloth (Beaujolais), wine, and cattle. Pop. 16,600.

Villefranche-de-Rouergne, a tn. of France in the dept. of Aveyron, on the R. Aveyron. There are manufs. of hemp, and phosphate quarries, sul-

phur springs, and tin and argentiferous lead mines are in the vicinity. The church of Notre Dame, with its massive tower, dates from the thirteenth century. Pop. 6000.

Villehardouin, Geoffroi de (c. 1160-c. 1213), early Fr. historian, b. in Aube. He took part in the Fourth Crusade, was several times employed in negotiations, witnessed the capture of Constantinople in 1204, and was appointed by the Emperor Baldwin marshal of Romania. He afterwards served the Emperor Henry, commanding under him in a naval battle at the fortress of Cibotus, and received the fief of Messinopolis. His *Histoire de la Prise de Constantinople par les Français et les Vénitiens* is a valuable record of the events of the crusade from 1198 to 1207. The first printed edition appeared in 1585; subsequent editions are by De Wailly (1874) and Bouchet (1891). A trans. of the *Chronicles* by Sir F. Marzials is printed in the Everyman's Library.

Villein, in feudal law, one who held lands by base or servile tenure. Vs. are generally believed to have been either (1) *regardant* or *adscriptiti glebae*, i.e. attached to the soil; or (2) *in gross*, i.e. annexed to the person of their lord; but Vinogradoff would seem to have disposed of this legal fiction. The system of villeinage gradually died out after Wat Tyler's rebellion in 1381. See Vinogradoff's *Village in England*, 1892.

Villemarqué, see LA VILLEMARQUÉ, THÉODORE CLAUDE HENRI HERSART, VICOMTE DE.

Villena, a tn. in the prov. of Alicante, Spain, about 30 m. N.W. of Alicante. The chief product is salt. Pop. about 16,000.

Villena, Enrique de (1384-1434), a Spanish writer, showed great capacity for learning and was reputed to be a wizard. He was appointed master of the military order of Calatrava in 1404, but after 1417 retired and devoted himself to literature. He pub. *Arte de Trovar*; *Los Trabajos de Hércules*, a pedantic allegory; *Tratado de la Consolacion*; *Arte Cistoria*, a handbook on the pleasures and fashions of the table; *Libro de Ojomiento*, a dissertation on the evil eye and its effects; and the first translation of the *Æneid* into Spanish.

Villeneuve, Pierre Charles Jean-Baptiste Silvestre (1763-1806), a famous Fr. admiral. At the age of fifteen he entered the navy, was rapidly promoted, and in 1796 attained the rank of rear-admiral. In the battle of the Nile he commanded the rear of the fleet and escaped with two ships and two frigates to Malta. In 1804 he was created a vice-admiral.

and in the next year he, with Admiral Gravina with several ships, sailed for the W. Indies, where they captured some British merchant vessels. In coming back Sir R. Calder intercepted them, but during the night they took refuge in Ferrol, whence they sailed to Cadiz. Here Nelson, after some weeks, caused V. to come out with his fleet (Oct. 19), and on the 21st the British fleet entrapped him off Cape Trafalgar (see TRAFALGAR, BATTLE OF). In 1806 V. was liberated and returned to France; he reached Rennes, where after a few days he was found dead in his room.

Villeneuve-sur-Lot, a tn. of France, in the dept. of Lot-et-Garonne. It is an important agricultural centre and has trade in plums, cattle, horses, wine, and market garden produce. Pop. 7000.

Villeroi, François de Neuville, Duc de (1614-1730), a Fr. soldier, the son of Marquis de V., marshal of France. He was brought up with Louis XIV., with whom he was a favourite, and in 1693 rose to be marshal of France. But he showed great incapacity in the Netherlands, 1695-96, and in 1701 was defeated and taken prisoner by Prince Eugene in Italy. He was again defeated by Marlborough at Ramillies, 1706, after which he lived the life of a courtier.

Villiers, see CLARENDON, GEORGE WILLIAM FREDERICK VILLIERS.

Villiers, see BUCKINGHAM, GEORGE VILLIERS, DUKE OF.

Villiers de l'Isle-Adam, Philippe Auguste Mathias, Comte de (1840-89), a Fr. poet, b. in Brittany. He was descended from the last grand-master of the Knights of Malta, and gained a reputation both as a satirist and a poet. Among his works are: *Azel* (Eng. trans. H. P. R. Finberg, 1925); *Le Nouveau Monde*; *La Révolte* (Eng. trans. Theresa Barclay, *Revolt and Escape*, 1901); *Le Secret de l'Echafaud*; *Morgane*; *Isis*; *Contes cruels*, a fine volume of short stories (Eng. trans. Hamish Miles, *Sardonic Tales*, 1927); *L'Eve future*, an amazing piece of buffoonery satirising the pretensions of science. See Biography by E. de Rougemont, 1910.

Villon, François (1431-c. 1455), a Fr. poet, b. of poor parents in Paris, real name probably MONTCORBIER. At an early age he became a student in arts, and by 1452 had taken his M.A. degree. After this little is known of him until 1455, when he was sentenced to banishment for killing a priest in a street brawl; 1456 saw him again in trouble, and the following year he was accused of being the ringleader of a gang of burglars, and sentenced, with others, to be hanged. Having appealed, he

was banished and went to Roussillon in Dauphiné, but in 1461 he was again caught at his old game and imprisoned at Meung-sur-Loire. Being released he was promptly involved in a street quarrel and again arrested, tortured, and condemned to be hanged, but the sentence was commuted to banishment, 1463, and from this time V. passes from history, but is supposed to have died in a priest's house in Poitou. He was the author of *Grand Testament*, *Petit Testament*, and some forty or fifty short pieces, chiefly ballades, notably: *Ballade des Dames du Temps Jadis*; *La Grosse Margot*; *Ballade des Pendus*; *Ballade pour sa Mère*; *Regrets de la Belle Heaulmière*, which occur mainly in the body of his *Grand Testament*. His two books of verse remain among the great treasures of Fr. poetry. It was V. who perfected the ballade. V. was all things by turns in his poetry—witty, sardonic, gay, mocking, plunged into the utmost despair, penitent and at times even religious. The *Petit Testament*, in which he draws up a list of mocking bequests to his friends and his enemies, is a masterpiece. Some of his ballades are, to twentieth-century taste, shocking in their realism. The best modern editions of V.'s poems are those of Paul Lacroix, Pierre Jannet, Longnon (1892), Moland (1893), and H. de Vere Stacpoole (1913). See Pierre Champion, *François Villon, sa Vie et son Temps*, 1913; D. B. Wyndham Lewis, *François Villon: a Documented Survey*, 1928; also *Works of Villon* with text and translation, ed. G. Atkinson, 1930.

Vilna, see Wilno.

Vimeiro, a vil. in Estremadura, Portugal, where Wellington defeated the Fr. in 1808. Pop. 700.

Vinca, see PERIWINKLE.

Vincennes: (1) A suburb on the E. of Paris, France, in the dept. of Seine. Its celebrated castle, which now serves as a fort, arsenal, and barracks, was built by Philip of Valois, John, and Charles V., on the site of a feudal fortress founded in 1164 by Louis VII. The Bois de Vincennes, which was the site of the Fr. Colonial Exhibition, 1931, lies between the fortifications of Paris and the right bank of the Marne. V. has manufs. of chemicals, pianos, organs, metal plates, perfumery, and mineral waters. Pop. 41,500. (2) A city of Indiana, U.S.A., co. seat of Knox co., on the Wabash R. It has a Rom. Catholic cathedral (1835) and a university (1896), is a railway and manufacturing centre, and produces ploughs, cultivators, ice-cream moulds, cigars, has paper and strawboard mills, furniture factories, and manufs. radio and phonograph

cabinets. There are also flour mills, a starch factory, iron foundries, and machine shops. Grain, pork, and flour are shipped; rose gardens are important; and there are coal mines and gas and oil wells. Site of Fr. fort, taken in 1763 by British. Captured by revolted colonists in 1779 and ceded to U.S.A. in 1783. Formerly cap. of territory of Indiana. The oldest settlement in the state. Pop. 17,000.

Vincent, Saint (*d.* 304), a deacon and martyr, who suffered under the persecution of Diocletian. He was a native of Spain, and was educated by Valerius, Bishop of Saragossa, who ordained him deacon. For professing his faith he was taken to Valencia and put to death. His festival is celebrated on Jan. 22.

Vincent, George Edgar, American educator; *b.* March 21, 1864, at Rockford, Ill.; son of Bishop John Heyl V. Graduated Yale, 1885. Vice-principal of Chautauqua system since 1888. President Chautauqua Institution, 1907-15; hon. president since. In Chicago University, professor of sociology, 1904-11; dean of the faculties of arts, literature, and science, 1907-11. President University of Minnesota, 1911-17. President Rockefeller Foundation, New York, 1917-20.

Vincent de Paul, St. (1576-1660), a Fr. divine and philanthropist, *b.* at Pouy, France. He was ordained priest in 1600, but on a journey to Marseilles in 1604 he was taken prisoner by Turkish pirates and carried off to Tunis, where he was sold as a slave. He served three masters, but the last one liberated him in 1607. He returned to Paris in 1609, became curé of Clichy, and then tutor to the children of the Gondi family. He soon devoted himself to the relief of the poor, establishing what he called 'confréries de charité' in various tns. in France. In 1625 he founded the Congregation of Mission Priests to train preachers who were to act as assistants to the regular clergy; and in 1632 the Mission of the Sisters of Charity, who devoted themselves to the care of the sick. He was canonised in 1739.

Vincent of Beauvais (*c.* 1190-c. 1264), a Dominican friar, who has been regarded as the precursor of the encyclopædists. He compiled a summary of general knowledge under the title of *Speculum Majus*.

Vinci, see LEONARDO DA VINCI.

Vindelicia, a Rom. prov., bounded on the N. by the Danube, on the W. by the territory of the Helvetii, on the S. by Rætia, and on the E. by the R. (Enus) (Inn). It was conquered by Tiberius in 15 B.C.

Vindex, Gaius Julius, was prætor of Gallia Celtica in the reign of the Emperor Nero. He rebelled against the authority of Nero in A.D. 68, being the first of the Rom. governors to do so, and offered the throne to Gamba. Verginius Rufus, the governor of Upper Germany, went against him and the two held a conference at Vesonio, after which V. committed suicide.

Vindhya Mountains, a series of mountain ranges in Central India, connecting at the extremities with the Eastern and Western Ghats.

Vine, or *Vitis vinifera*, a climbing plant, a native of Asia, and cultivated from a remote period for its fruit, which, besides being one of the choicest dessert fruits, is made into wine and other fermented drinks, while the dried fruits of certain varieties furnish raisins and currants. The V. was formerly much planted against sunny sheltered walls in the S. of England, but its production of fair-sized fruit is irregular. In a greenhouse its culture is easy; the roots are generally set in a border outside, the stem passing under arches or through holes into the house, where the shoots are trained up the roof. By control of the temperature, and management of ventilation, fruit can be ripened, according to variety, over many months. The following are the principal vine-producing countries with their extent of vineyard in hundreds of acs.: France, 3500; Spain, 3000; Italy, 2000; U.S.A., 710; Algeria, 566; Hungary, 540; Portugal, 530; Yugoslavia, 450; Rumania, 390; Greece, 360; Argentina, 280; Germany, 205; Bulgaria, 200; Australia, 115; Switzerland, 40. A. I. Perold, *A Treatise on Viticulture*, 1927.

Vinegar, a weak solution of acetic acid containing colouring matter, is obtained by the acetic fermentation of poor wine, sour beer, or other dilute alcoholic liquids. In the Fr. or Orleans process, a small quantity of wine is placed in large vats covered with perforated lids. The vats are previously soaked inside with hot V., and the ferment (*Mycoderma aceti*) soon gets into the wine. Periodical additions of wine are made until the cask is about half full. The V. obtained is then drawn off and the operations repeated. In the Ger. or 'quick' V. process diluted raw spirit (6 to 10 per cent. of alcohol) with beer or malt extract is allowed to trickle through perforated vats containing beech-wood shavings, which are covered with the ferment. V. by the Fr. process contains 6 to 10 per cent. of acetic acid, whereas that from the quick process contains

only 4 to 6 per cent. White V. is obtained from inferior wines, while malt V. is prepared from beer. See C. A. Mitchell, *Vinegar, its manufacture and examination*, 2nd ed., 1926.

Vinegar Hill, a mountain in Ireland, 14 m. from Wexford, where, in 1798, the Irish rebels were defeated by General Lake.

Vineland, a bor. in Cumberland co., New Jersey, U.S.A., 34 m. S.S.E. of Philadelphia. Chief manufs.: boots, shoes, glass, chemicals, cigars, thermometers, baskets, and clothing. It has iron and brass foundries, canneries and meat packing houses, stone-works and many other industries. The New Jersey Training School for Backward Children is at V. There are poultry and fruit farms. Pop. 7556.

Vinet, Alexandre Rodolphe (1797-1847), a Swiss divine and author, b. at Lausanne. At the age of twenty he was appointed professor of Fr. language and literature at Basel. This position he held till 1837, when he removed to Lausanne, to fill the chair of practical theology in the academy of that city, which chair, however, he resigned in 1840, when he seceded from the national church. V. took a leading part in the formation of the Free Church of Vaud, formed by seceders from the national church in 1845, this secession having been in a great measure the result of his writings in favour of the separation of church and state.

Vingt-et-Un. This is an old card game, the object in which is to make out of the cards one holds 'twenty-one.' One card is dealt to each player, including the dealer. Maximum and minimum stakes are arranged beforehand. The players look at their cards and stake accordingly. Roughly, it may be said that the game proceeds thereafter by a second deal and by the exercise of the option to draw further cards so as by a certain combination to make the desired total. An ace counts as 11 or 1, court cards 10, and the other cards according to 'pips.' Anyone can infer for himself the probability of receiving at the second deal, or by drawing, a card which will supplement the first card to the right value. The combination of an ace with a court card or other tenth card is called a 'natural.' Obviously, the ace is the best first card to hold, because counted as 11, no less than 16 other cards will with it form 21; while if the player overshoots the mark, he has a still further chance by counting it as 1. The dealer, after the first round is dealt, has the right to double the stakes, with the result that if he ultimately wins he will receive, or, if he loses

pay, twice the pool. After the dealer has decided whether he will double or not, the second round is dealt. Those holding 'naturals' get double their stakes from the other players. If no one has a 'natural' the dealer must offer fresh cards in rotation, beginning with the player on his left. If a player draws a card which brings his total over 21, he hands his stake to the dealer. Those who have not overdrawn are said to 'stand' (whether their total is 21 or under), but the total must not as yet be revealed. The dealer's turn comes last. If he overdraws, he has to pay all round, except to those who have already handed in their stakes, by reason of overdrawing. The player with exactly 21 gets double his stake. If the dealer wins, he gets double his stake from each of the others remaining in the game. There is a variation of this game called *Fr. vingt-et-un*, the most marked difference in which consists in the fact that the players, after staking, are not allowed to look at their cards, and, therefore, draw at haphazard. Such a variation makes the game still more of a gamble.

Vinland, or **Wineland**, a name given by the Norsemen to the part of America discovered by them, because of the abundance of grapes there. Sighted by Bjarne Herjulfson (986), and explored by Lief Eriksson (c. 1000). Probably corresponds with Newfoundland or the New England states. Supposed Norse inscriptions have been found at Newport and at Dighton, Massachusetts, but though the characters bear some resemblance to Runic symbols the evidence is inconclusive. In the *Saga of Red Erik* we are told that 'from its products Lief gave the land a name, and called it Wineland,' and that 'their afterboat was filled with grapes.' See A. M. Reeves, *The Finding of Vinland the Good*, 1890.

Vinogradoff, Sir Paul Gavrilovich (1854-1925), Russo-British jurist; b. at Kostroma, N.E. of Moscow. Doctor of history, Moscow University. In 1887, pub., in Russian, a work on the origins of feudalism in Lombard Italy. Travelled; acquired seven modern languages. Wrote, in Russian, *Enquiries into the Social History of England*; afterwards usually wrote in Eng. *Villainage in England* appeared 1892. Resigned professorship at Moscow because of difficulties with bureaucracy, 1902; took up residence in England. Corpus Prof. of Jurisprudence, Oxford, from 1903. Knighted, 1917. Works include: *Growth of the Manor*, 1905; *English Society in the Eleventh Century*, 1908; *Roman Law in Medieval Europe*,

1909; *Common Sense in Law*, 1914; *Self-Government in Russia*, 1915; *Historical Jurisprudence*, 1920-22. Died in Paris, Dec. 19.

Viol (*It. viola*), the generic name for the group of stringed instruments of the fifteenth to the seventeenth century preceding modern types. The V. was made in four sizes, and had from five to seven strings, tuned in thirds and fourths: (i.) the treble or discant; (ii.) alto, tenor, or viola da braccio; (iii.) bass, viola da gamba—corresponding respectively to the modern violin, viola, and violoncello; and (iv.) the contra or double bass, still in use.

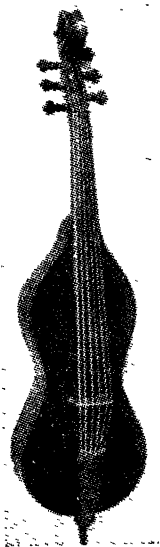
Viola, a genus of perennial plants (order Violaceae) which includes not only the violet (*V. odorata*) but also the pansy (*V. tricolor*) and the tufted pansies or florists' Vs.

Viola, or Tenor Violin, *see* VIOLIN.

Violet, the name of a number of British plants, including the sweet V., marsh V., hairy V., dog V., and mountain V. Many of them are interesting for their production of cleistogone flowers, yielding an abundance of seed in autumn; while the more conspicuous familiar spring flowers yield little or no seed.

Violin, Viola, Violoncello, and Double Bass, stringed musical instruments played with the bow. The *Violin* consists of a resonant wooden box called the body; the neck, a solid piece of wood to which is attached the finger-board; and the strings, fastened at one end to the lower part of the body by means of a projecting tail-piece, and at the other to pegs in the head, the scroll-like termination of the neck. The body consists of two thin, arched pieces of wood joined by side-pieces, or ribs, to form a shallow box. The top surface, or belly, is made of a soft wood, pine or fir. The under surface, or back, is generally of maple or sycamore, as are the ribs. The body is so constructed that there are two deep inward curves in its sides, nearly opposite the portion of the strings on which the bow plays. The neck also is of maple, glued and mortised to a block fixed in the upper part of the body. The tail-piece and finger-board are of ebony, this hard wood being specially necessary in the latter case to prevent the finger-board from being worn into hollows by the player's fingers. Sound-holes are cut in the belly in the form of an *f* on either side of the bridge. The bridge itself is of maple, cut in a peculiar shape, which has remained practically unaltered since its introduction by Stradivarius. Under the right foot of the bridge—or rather a little way behind it—is the sound-post, a small rounded bar of soft pine, joining the

back and belly of the instrument, and serving the double purpose of supporting the pressure of the strings and communicating the vibrations to the back. Without the sound-post the tone would be very weak and of a poor quality. The bass-bar is a strip of wood glued to the inside of the V., and passing under the left foot of the bridge. The strings are of catgut and are tuned in fifths, the highest, or first string, sounding the E on the fourth space of the treble clef, and



DESCANT VIOLA DA GAMBA
(VIOLETTA PICCOLA) BY
FRANCESCO LINAROLO,
VENICE, c. 1540

the other three the A, D, and G. In order that the fourth string may not be too thick, the requisite weight is obtained by covering a thin gut string with fine silver wire, or copper wire silvered. In all there are about seventy pieces of wood used in the construction of the V., though the number may vary. Curiously enough, since the time of the early Italian masters there has been scarcely any alteration in the shape of the V., and modern makers are still following the model of Stradivarius, and endeavour unsuccessfully to reproduce his

exquisite tone, which is often supposed to be the result of a secret varnish, but which may be more sensibly attributed to the untiring efforts and experiments to which the old Italian makers devoted their lives. The *Viola* is slightly larger than the violin, and more than proportionately thicker. It is tuned in fifths and a fifth below the violin. Music for this instrument, which is called the tenor violin, is generally written on the C-clef (third line). Its tone is somewhat grave and melancholy, and its quality has an attractiveness quite different from the charm of the violin. The *Violoncello* is much larger than either violin or viola, and is held between the player's knees. Like the others, it has four gut strings, but in this case the two lower strings are generally silver-covered. The signature is the bass clef, and it is tuned in fifths, an octave below the viola. The *Double Bass* is largest of all, having a deep, rough tone. It differs somewhat from the other stringed instruments chiefly in having sloping shoulders, and in being differently tuned. Formerly double-basses had only three strings tuned in fifths—A, D, G, on the bass staff—but a fourth string is now usually added, sounding the E below the staff, and the strings are tuned in fourths—E, A, D, G. The *mute* is a contrivance for fixing on the bridge of all stringed instruments to deaden the sound. It produces a dull, veiled note, which, when properly used, is very effective. In following the history of the V. it is necessary to note the distinction between *plucked* and *bowed* instruments. They are, in fact, of entirely different origin. It is generally agreed that stringed instruments played with a bow were used in Asia at a very early date, the oldest known form being the *ravanastrom*, a hollow cylinder of wood, with serpent-skin stretched on one side, and strings fastened to a wooden rod. It was played with a bow of bamboo and horse-hair. To this curious instrument Indian tradition assigns the date 5000 B.C., when it was said to have been invented by Ravana, King of Ceylon. The assumption that the Welsh *croth* was the forerunner of the V., because it was latterly played with a bow, appears to be erroneous. The earliest form in which the Asiatic instrument reached Europe was the Persian or Arabian *rebab*, which became the Fr. *rebek*, of which a drawing appears in a MS. of the Abbé Gerbert, early in the ninth century. The next development was the *riol*, which was the immediate precursor of the violin. A lute-maker of Brescia, Johann Kerlino, was said to

have manufactured violins as early as 1449, in which case he was certainly the founder of the Brescian school. But the first maker who is known to have produced the violin as we now have it was Gaspar da Salo, who worked about 1560. His violins were large, very arched, and varnished dark brown. After him came the Brescian school—Maggini, Zanetto, Peregrino, Raphael, and others. Early in the sixteenth century Andreas Amati founded the Cremona school. He made some improvements, but accomplished less than did his sons, Antonio and Jerome. The most famous member of this family was Nicolo, son of Jerome, who taught the still more famous Antonio Stradivarius (q.v.) (1644–1737). The latter, as said above, has set the standard for succeeding generations. Among his pupils the foremost were Carlo Bergonzi and Giuseppe Guarneri. In the family of the latter there were many violin makers, the most successful being Giuseppe Antonio Guarneri (q.v.) (b. 1683). Of modern names the best known is Vuillaume, of Paris. The latter city has also produced the most famous maker of V. bows—François Tourte (c. 1780). Among the greatest composers of V. music are Tartini, Viotti, Corelli, and Spohr; while of performers some of the most prominent are Paganini (the greatest violinist who ever lived), Spohr, Ole Bull, and Lady Hallé; and, of recent years, Kubelik, Kreisler, and Ysaye. Viola and 'cello playing have had and still have their great exponents, while Dragonetti (1755–1846) was a famous performer on the double bass. Consult Forster and Sandys, *His Story of the Violin*, 1864; E. Heim, *Neuere Führer durch die Violin-Litteratur*, 1901; A. Bachmann, *An Encyclopædia of the Violin*, translation by F. H. Martens, ed. by A. E. Wier, 1925.

Viollet-le-Duc, Eugène Emmanuel (1814–79), a Fr. architect and writer, son of the *littérateur* of the same name. Studied under Leclère, and travelled widely through France. Was in 1840 charged with the restoration of many churches, gaining an immense reputation. In 1845 he gained, in competition, the work of restoring Notre Dame together with Lassus. By 1853 he was acknowledged to be the greatest living architect. In 1863 he became professor at the Ecole des Beaux-Arts. In 1870 he organised the external defences of Paris during the siege. After the war he became a violent Republican and in 1874 was elected to the Paris municipal council. His admission of being a freethinker lost him his positions in connection with church architecture. He wrote

many works, distinguished for vigour and polish, including a great *Dictionary of French Architecture* (1854-68), and various essays and books on architectural subjects. See *Life* by Saint-Paul (1831). His letters have been edited by his son (1902).

Violoncello, or **Cello**, see **VIOLIN**.

Vionville, a vil. of Lorraine, about 12 m. W. of Metz. It is famous for the battle fought there between the Fr. and Gers. in 1870, and is known also as Mars-la-Tour.

Viotti, **Giovanni Battista** (1753-1824), the father of modern violin-playing and composer of much artistic merit; studied with Pugnani; toured Germany, Poland, Russia, and London, and was opera-director at Paris (1819-22). He left thirty concertos, many sonatas, and quartets which are still admired.

Viper (**Viperidae**), a family of poisonous snakes, most abundant in Africa and S.W. Asia. The common V. or adder (*q.v.*) (*Vipera berus*) is the only poisonous British snake. Others of the genus are the horned V. (*V. cornuta*) and Russell's V. (*V. Russellii*). The rattlesnakes are also members of this family.

Viper's Bugloss, or *Echium vulgare*, a British plant (order Boraginaceæ) with bristly stems and leaves; and spikes of flowers which are at first rose colour, later turning to blue.

Vipsania Agrippina (d. A.D. 20) was the daughter of M. Vipsanius Agrippa and Pomponia. She was first married to Tiberius, to whom she bore a son Drusus, but being divorced by him became the wife of Asinius Gallus.

Vipsanius, see **AGRIPPA**, **MARCUS VIPSANIUS**.

Virbius, a Latin divinity, said to have been the same as Hippolytus, who was restored to life by Æsculapius at the request of Diana. He was worshipped with Diana in the grove at Aricia.

Virchow, **Rudolf** (1821-1902), Ger. pathologist and anthropologist, b. at Schwelbein in Pomerania. In 1839 he went to Berlin, and took his doctor's degree in 1843. With Reinhardt he founded the *Archiv. für path. Anatomie und Physiologie* and remained editor throughout his life. His *Cellular Pathology* was pub. in 1858, Eng. trans. 1860, surpassing all former pathological systems; two other volumes, *Die krankhaften Geschwülste*, between 1863 and 1867; *Vier Reden über Leben und Kranksein* appeared in 1862; *Lehre von den Trichinen* in 1865. From 1856 until his death he held the chair of pathological anatomy at Berlin University. His reputation was immense. Politically he was also active, and was

elected (1862) a member of the Prussian Lower House. He entered the Reichstag (1880), and became leader of the opposition and an opponent of Bismarck. He was also a distinguished archaeologist, accompanying Schliemann in the excavation of Troy. See books by W. Becher, 1891, and Carl Posner, 1921.

Vire, a tn. of France in the dept. Calvados, with a castle built by Henry I. of England in the twelfth century. There is also the picturesque Tour de l'Horloge (thirteenth century), the church (thirteenth, fourteenth, and sixteenth centuries), and the town-hall (seventeenth century) containing a fine collection of porcelain and pictures. Pop. 5900.

Virgil, **Polydore**, see **VERGIL**.

Virgil, **Virgilius**, or **Vergilius Maro**, P. (70-19 B.C.), a Rom. poet, b. on Oct. 15 near Mantua in Cisalpine Gaul. He was educated at Cremona and Mediolanum (Milan), and he took the toga virilis at Cremona in 55. It is said that he subsequently studied at Neapolis (Naples) under Parthenius, a native of Bithynia, from whom he learned Gk. He was also instructed by Syron, an Epicurean, and probably at Rome. V.'s writings prove that he received a learned education, and traces of Epicurean opinions are apparent in them. After completing his education, V. appears to have retired to his paternal farm, and here he may have written some of the small pieces which are attributed to him. In the division of land among the soldiers after the Battle of Philippi (42) V. was deprived of his property; but it was afterwards restored to the command of Octavian. It is supposed that V. wrote the Eclogue which stands first in our editions to commemorate his gratitude to Octavian. V. probably became acquainted with Mæcenas soon after writing his *Eclogues*, in which Mæcenas is not mentioned. His most finished work, the *Georgics*, was undertaken at the suggestion of Mæcenas (*Georg.*, iii. 41); and was completed after the Battle of Actium, 31 B.C., while Octavian was in the East. V. appears to have commenced the *Æneid* about this time. A passage in the 7th book (606) appears to allude to Augustus receiving back the Parthian standards, which event belongs to 20. When Augustus was returning from Samos, where he had spent the winter of 20, he met V. at Athens. The poet, it is said, had intended to make a tour of Greece, but he accompanied the emperor to Megara, and thence to Italy. His health, which had been long declining, was now completely broken, and he d. soon after his arrival at

Brundisium on Sept. 22, not having quite completed his fifty-first year. Besides the *Bucolics*, *Georgics*, and *Æneid*, several shorter pieces are attributed to V., which may possibly have been the productions of his youth. Such are the *Culex*, *Ciris*, *Copa*, etc. Of all his works the *Georgics* is both the most finished and the most original. The *Æneid* (q.v.) is the great national epic of the Romans. The glories of Rome and the fortune of the Julian house, to which Augustus belonged, are skilfully interwoven in the texture of the poem. V. must be considered as by far the first of all the Rom. epic poets. The best Eng. ed. of V. is that of J. Conington and H. Nettleship with Eng. commentary, in 3 vols., 5th ed., rev. by F. Haverfield, 1898. Of many Eng. translations of V. the best known are by Dryden, verse, 1697; Conington, prose, 1882, *Æneid* only, verse, 1866; W. Morris, *Æneid*, verse, 1876; J. W. Mackail, *Æneid* and *Georgics*, prose, 1885-89; E. F. Taylor, *Æneid*, verse, 1903 (Everyman's Library, 1907); H. R. Fairclough (with Latin text), 1916 (Loeb Library); A. S. Way, *Æneid*, verse (with Latin text), 4 vols. 1916-30. See also Prof. Sellar's fine and sympathetic volume of studies (2nd ed. 1883); J. B. Greenough's *Special Vocabulary to Virgil*, 1883; Comparetti's *Virgil in the Middle Ages* (Eng. ed. 1895); W. W. Fowler, *A Year with the Birds* (including a section on the birds of V.), 1925; M. N. Wetmore, *Index Verborum Vergilianus*, New Haven, 1911; H. W. Garrod, *Virgil*, 1912; R. S. Conway, *The Philosophy of Virgil*, 1922, and *Virgil as a Student of Homer*, 1929; B. Nardi, *The Fouth of Virgil*, Eng. trans. 1930; C. Saunders, *Vergil's Primitive Italy*, 1930.

Virginal, see HARPSICORD.

Virginia, one of the thirteen original states of the American Union, bounded on the N. by West Virginia and Maryland, on the E. by Atlantic Ocean and Maryland, on the S. by N. Carolina and Tennessee, on the W. by Kentucky and West Virginia. It has an area of 42,627 sq. m., and is divided into: Tidewater V., the low-lying region along the coast; Middle V., a great triangular plain much divided by its many rivs.; the Piedmont strip, and the Blue Ridge, Shenandoah and Alleghany mountains, with the valley region between. Agriculture is largely carried on; the chief crops being Indian corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, cotton, and tobacco. Two thirds of the area of the state are given over to farming. But manufacturing establishments are increasing and among important industries

are lumber and timber products, tobacco manufactures, and flour and grist-mill products; the state also produces large quantities of leather and cotton goods, boots and shoes, fertilisers, cars, foundry and machine-shop products, and iron and steel from blast furnaces. Among important minerals are coal, pig-iron, zinc, lead, and gold. The 1500 m. of tidal shore on the Atlantic, Chesapeake Bay, and the entering rivs. have important fisheries, especially of oysters. The chief ports are Norfolk and Newport News, on Hampton Roads, formed by the estuary of the James, on which riv. stand Richmond, the largest city and cap. and other important cities. The first permanent Eng. settlement was made at Jamestown in 1607 under the leadership of John Smith. In 1624 the charter formerly possessed by V. was revoked and V. became a crown colony. During the Fr. and Indian war Virginians saved Braddock's army from annihilation. V. took a leading part in the Revolution, and seceded with the Southern States in 1861. The western part of the state, which was against secession, broke away during the civil war and became the state of West Virginia. V. is famous for its educational institutions, including the University of Virginia, Washington and Lee University, William and Mary College, Virginia Military Institute and Hampton Normal School, the latter being the first school for negro higher education established in the S. V. has been called the 'Mother of Presidents.' Five were not only from V., but were residents there when elected. George Washington, George Jefferson, James Madison, James Monroe, and John Tyler. Three others were b. in V., but were residents of other states—W. H. Harrison, Zachary Taylor, and Woodrow Wilson. Leading cities are Richmond, 182,929; Norfolk, 129,710; Roanoke, 69,206; Portsmouth, 45,704; Lynchburg, 40,661; Pop. of the state (1930), 2,421,851. Consult W. Stith, *History of the First Discovery and Settlement of Virginia*, New York, 1865; W. Meade, *Old Churches, Ministers and Families of Virginia*, Philadelphia, 1872; J. E. Cooke, *Virginia*, American Commonwealths Series, Boston, 1884; J. Fiske, *Old Virginia and Her Neighbours*, London, 1897; S. A. Drake, *The Making of Virginia and the Middle Colonies, 1578-1701*, London, 1894; T. J. Wertenbaker, *Virginia under the Stuarts (1607-88)*, Princeton and London, 1914; H. J. Eckenrode, *The Revolution in Virginia*, Boston 1916; E. A. Lancaster, *Historic Virginian Homes and Churches*,

Philadelphia, 1915; F. and C. Hutchins, *Virginia*, 1922.

Virginia, a city of Minnesota, U.S.A., which has rapidly developed during the last thirteen years. It has twenty-six iron mines and important iron foundries. There are saw-mills, and farming is carried on. Pop. (1930) 11,963.

Virginia, the daughter of L. Virginius, a Rom. centurion. Her beauty excited the lust of the decemvir Appius Claudius, who instigated one of his clients to claim her as his slave. In order to preserve her innocence her father stabbed V. As a result both camp and city rose against the decemvirs, and the old form of gov. was restored.

Virginia, University of, the greatest and most celebrated institution of learning in the S. of the U.S.A. It was originally proposed in 1803 that the state should support a school to be known as Albemarle Academy. When Thomas Jefferson joined the board in 1816 the name was changed to Central College. In 1818 Jefferson, who had twice been President of the U.S.A., got the title of the school changed to its present one and it was opened in 1825 in Charlottesville, Virginia. Jefferson drew the architectural plans for the main semi-Gk. buildings, the famously beautiful campus, and the old serpentine brick walls that he so loved when he saw them in England. Jefferson also drew up the plans for the very liberal curriculum and invented the honour system whereby the students were not under espionage when writing their examination papers. Two other former Presidents of the U.S.A. were also connected with the university, James Madison and James Monroe. For years students destined to be the leaders of the old S. and, later, of the new S., were educated there. The state grants the university an annual sum and it now has endowments of over ten million dollars. In addition to the regular academic courses, law, medicine, and engineering are taught there. Edgar Allan Poe took the academic course there, but did not graduate. President Woodrow Wilson studied law there.

Virginia, West, see WEST VIRGINIA.

Virginia City, a city and co. seat of Storey co., Nevada, U.S.A., settled in 1859 when the famous Comstock Lode was discovered. The mines under the city produce large quantities of gold and silver bullion. Pop. 590; a decrease, due to the lowering of the price of silver.

Virginia Creeper, a genus of climbing plants, including *Ampelopsis hederacea*, the common V. C., and Veitch's V. C. (*Vitis inconspans*).

Virginia Plan. The abortive scheme for the U.S. constitution framed by the larger states immediately after the War of American Independence. When in 1787 the Federal Convention of the newly independent American colonies met in Philadelphia to frame a constitution for the new country the people hoped to found, a conflict at once broke out between the larger states and the smaller ones. The latter were jealous of any enactment which might give the larger states a preponderance of power in the new union. On behalf of the larger states Governor Edmund Randolph of Virginia presented the V. P., which had been drafted for the most part by James Madison. The V. P. provided that power should be divided between the executive, legislative, and judicial departments. Congress was to consist of two Houses, one to be chosen directly by the people. This House, in turn, was to elect the members of the second House. On behalf of New Jersey the small state plan was presented, which provided that the small states should have equal representation in Congress with the large states. It seemed that the convention would be openly divided over this issue. Finally the Connecticut compromise was adopted, the small states carrying the day. Each state in the convention had only one vote. Five small states voted for the compromise, four large states voted against, Massachusetts was divided, and the other states did not vote. Under this compromise it was agreed that for the House of Representatives Congressmen should be elected by a proportional vote based upon the pop. of the states. This was part of the original V. P. But it was also agreed that in the Senate each state, regardless of pop., should have two Senators. This important clause of the constitution was a complete victory for the small states. At the same time it was provided that all money Bills should originate in the House of Representatives, although this should not prevent the Senate from amending them radically if it chose, so that the two Houses would then have to find a compromise.

Virginia Water, a dist. of Egham, Surrey, Eng. The lake lies in the S. of Windsor Great Park, and was formed by the Duke of Cumberland, the victor of Culloden.

Virgin Islands, The, are a group of three islands, St. Thomas, St. Croix and St. John, together with about fifty smaller ones, all in the W. Indies. Total area, 133 sq. m. They belong to the U.S.A., who bought out Denmark in 1917. Sugar, bay oil and bay rum

are the main industries. The rum trade is (1932) very depressed owing to the Prohibition Law of the U.S.A. Pop. 22,012. Prin. tns.: St. Thomas, 7036, Christiansted, 3767. The V.I. are under a Governor, appointed by the President of the U.S.A., with the approval of the Senate. Since it acquired the islands, the U.S.A. has spent over 7 million dollars there. President Hoover said when the U.S.A. paid 25 million dollars for them that it acquired a poor-house, comprising 90 per cent. of the pop. The only value of the islands to the U.S.A. is from a naval strategical standpoint. The V. I. belonging to Great Britain, also the W. Indies, were acquired in 1666. The chief are Tortola, Virgin Gorda, Anegada. Area of British possessions is 58 sq. m. and pop. 5082. Sugar, tobacco and cotton are grown.

Virgin Mary, see **MARY, THE VIRGIN**.

Virgo, the sixth sign of the zodiac, ♍, and an anct. constellation, noted for its nebulae, situated in the head and breast, of which the spiral Messier 99 is the chief. The constellation is entered by the sun about Aug. 21. It was usually represented by a woman holding an ear of corn, Spica, and was identified in Egypt, probably from Chaldea, with the goddess Ishtar. It marked the Egyptian harvest time. It is also associated with Astraea, Demeter, and Persephone. Spica is of magnitude 1.2; γ 3.6 is a binary with a period of 180 years, both variable; ϵ (Vindemiatrix) is of magnitude 3.0; η , another spectroscopic binary, has a period of 72 days. There are thirty stars of magnitudes 4.4 to 5.2.

Virtues, see **CARDINAL VIRTUES**.

Viscacha (*Lagotomus trichodactylus*), a large rodent found on the Pampas of S. America. The body is from 18 to 24 in. long, and the tail 6 to 8 in. The fur is mottled grey above and yellow on the under parts.

Vischer, Friedrich Theodor (1807-87), a Ger. philosophical writer, b. at Ludwigsburg, and educated at Tübingen, where he became *privat-docent* in 1835, and full professor in 1844. His writings include: *Ästhetik, oder Wissenschaft des Schönen*, 1846-57; *Kritische Gänge*, 1844-75; and *Altes und Neues*, 1881-89. See *Lives* by Ziegler, 1893, and Oswald, 1896.

Vischer, Peter (1455-1529), a Ger. sculptor, b. in Nuremberg. He executed a tomb of Archbishop Ernest in Magdeburg cathedral (1497), and of St. Sebald at Nuremberg (1508-18). See C. Headlam, *Peter Vischer*, 1901.

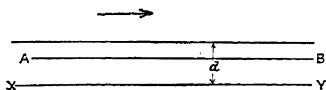
Visconti, the name of a noble Lom-

bard family which for a long time held dominion over Milan. This lordship was practically established by Ottone, who was appointed to the archbishopric of that town in 1262. He drove out the opposing family of the Della Torres, and left his possessions to his nephew, Matteo. In the fourteenth century the V. were in constant conflict with the papacy. During this century the V. were supreme in Milan, and Galeazzo II. was of such importance that he was able to marry his daughter and son respectively to the son of Edward III. of England and the daughter of the Fr. king. He greatly befriended the arts, established a university at Pavia, and was a patron of Petrarch. He was succeeded by the joint sovereigns Barnabo and Gian Galeazzo, the latter of whom was the most powerful of all the V. He was finally made Duke of Milan by the Emperor Wenceslaus. His brother, who succeeded him, and who was the last of the male V. line, d. in 1447.

Visconti-Venosta, Emilio, Marquis (1829-1914), Italian statesman; b. Jan. 22, at Milan, of a noble family of the Valtellina. Commenced his career as a violent anti-Austrian and Mazzinist; but later renounced Mazzini, although he always remained anti-Austrian. Associated with Cavour and Garibaldi, and by the former made an under-secretary of state. Took important part in movement for evacuation of Rome by the Fr., was also Director of Foreign Affairs in Italy during the strenuous days of the Franco-Prussian War. His policy and tact raised Italy high in the councils of Europe. He came to an understanding with France on the question of its relations in Tripoli and Tunis, and with Austria on the question of Albania and the Adriatic. Senator, 1886. An arbitrator in Behring Sea dispute, 1894. Foreign minister: 1896-98, 1899-1901. Delegate to Algeiras Conference, 1906. Died in Rome Nov. 28.

Viscosity, the property of a fluid whereby it resists the relative motion of its parts. Thus, for example, when tea is stirred by a spoon, it is the V. of the tea that brings it to rest again. Viscous forces are merely frictional forces of a special kind. The tea comes to rest under the action of liquid friction between the layers of tea that are moving at different speeds relative to one another, and under the action of the liquid friction between the cup and the layer of tea next to it. Fluids like pitch, treacle, and heavy oils are highly viscous, but all fluids, even gases, are viscous to some extent.

The ideal 'perfect fluid' is non-viscous, but no real fluid is perfect. The special character of this fluid friction was guessed intuitively by Newton who formulated the law of V . that has stood the test of experiment. Newton's law is best explained in the following way. Suppose a stream of liquid is moving from left to right (see Fig.) over a horizontal bed XY .



The velocity of any layer parallel to the bed depends on its distance above the bed; the layer next to the bed is at rest, while the surface layer is moving fastest. If we consider the layer AB we realise that the surface of the liquid immediately below it experiences a viscous force acting in the direction AB , tending to speed it up relative to the faster moving layer above it. The latter simultaneously experiences an equal and opposite viscous force in the direction BA , that acts as a drag on it tending to reduce its speed to that of the slower moving layer below it. As a result of these viscous forces the relative motion of the various layers will vanish unless there is some external force acting on the liquid to maintain the relative motion. Newton's law enables us to compute the viscous forces acting in this liquid. Suppose the surface layer is moving with a velocity v parallel to the bed; the layer XY is at rest. There is therefore a velocity gradient $\frac{v}{d}$, where d

is the depth of the liquid. The viscous force per unit area of any layer parallel to the bed is $\eta \frac{v}{d}$, where η is a constant for a given fluid at a given temperature, known as the coefficient of V . of the fluid. The direction of this force is parallel to the bed. When the moving parts of a machine are lubricated by means of a layer of oil the friction between the parts of the machine is greatly reduced. If, for example, the space between a plate moving over a fixed bed is lubricated by a film of oil whose thickness is d , the friction between the plates will be $\frac{\eta v}{d}$, where v is the velocity of the moving plate and η the coefficient of V . of the lubricating oil (see LUBRICANTS). Two examples serve to illustrate the V . of air. The vibrations of a pendulum are 'damped' by the air-

friction on its surfaces, while the V . of air is sufficiently great to balance the weight of raindrops moving with a certain speed. Raindrops, therefore, on reaching this speed continue to descend with a uniform velocity. The kinetic theory of gases gives a satisfactory explanation of the V . of a gas. According to this theory, there is a continuous exchange of molecules between any two layers of a gas. Hence if one layer is moving relative to the other, it receives slower moving molecules from the other layer and loses faster moving molecules to it. The effect is the same as if a viscous force acted across the surface separating the two layers, tending to destroy their relative motion. See E. Hatschek, *The Viscosity of Liquids*, 1928.

Viscount (from Low Lat. *vicecomes*, 'in place of earl,' through O. Fr. *viscomite*), in the U.K. the title of the fourth degree of nobility, between earl and baron, first granted in England to John Beaumont in 1440. Originally the title was given to the deputy sheriff, who acted on behalf of an earl within his estate.

Vishni-Volotchok, or Vyshnii-Volochok, a tn. in the prov. of Tver, Russia, on the Vishni Canal, 230 m. S.E. of Leningrad by rail. It has cotton and flour mills. Pop. 18,300.

Vishnu, occupies the second place in the Hindu Trimurti or Triad. He embodies the preserving principle, and his worship is of very ant. date, though he has gradually tended to engross a larger and larger share of popular worship. V . has undergone a number of Avatāras or Incarnations, the number given being various. His two most famous incarnations are those as Rama and as Krishna. Under the latter form he is the hero of the great poem, the *Mahābhārata*. He has several annual festivals in India, but in the N. parts of the country they are observed only in Bengal.

Visible Speech, the name of a method of educating deaf mutes by means of symbols representing the position of the organs of speech. It was invented by Alexander Melville Bell (*q.v.*) (1819-1905), a lecturer in elocution and philology. The alphabetic characters are themselves descriptive diagrams of the shape of the mouth in pronouncing the corresponding sounds, and words thus printed are calculated to suggest the spoken sounds. In this way deaf mutes have been taught to read aloud and to add to their speaking vocabulary. See A. M. Bell, *Visible Speech*; *The Science of Universal Alphabets*, 1887; *A Popular Manual of Visible Speech and Vocal Physiology*, 1889.

Visigoths, see GOTHs.

Vision:—Relation of General Sensibility to Special Sense.—Sensory nerve fibres are very fine cylindrical threads, ending outwardly in the sensitive surfaces and sense organs, and inwardly in the nerve centres, especially the brain. Impressions on their outer extremity are transmitted along the fibre with a velocity of about 100 ft. a second and determine changes in the nerve centres which in turn may determine changes in consciousness or sensation (*q.v.*). The optic nerves are organised to respond to the ethereal vibrations called light (*q.v.*) and nothing else. If, therefore, these nerves be mechanically irritated, we do not *feel* anything, but *see* a flash of light. All the higher senses may be regarded as the result of refinements of common sensation—each a more refined touch. In sight, we perceive objects at a distance which is illimitable, the vibrations being conveyed by a medium which is universal and too subtle to be recognised except as the bearer of light. We must differentiate between the direct data of V. or sight and what are added by the mind as *judgments* based on such data. The direct data are only *light*, its *intensity* and *colour* and *direction*. These, being incapable of further analysis, are simple sensations. But size and distance and solid form, though they may seem to be perceived, are not direct perceptions, but only very simple judgments based on these data (for the general structure of the eye see under *EYE*).

Formation of Images.—The eyeball may be regarded as consisting of two distinct portions—a nervous expansion, the *retina*, which responds to light-vibrations; and an optical instrument, the *lens apparatus*, placed in front of the retina, and arranged to make the impression of light strong and definite by means of an image. These two portions entirely differ in their physiological origin, but they meet and unite to form the eyeball, the sole object of which is the formation of a perfect image on the retina. Without images, we could perceive light, but not objects and the distinctiveness of objects exactly proportioned to the distinctiveness of retinal images. Hence a serviceable image must be sufficiently bright and perfectly sharp and distinct in outline, and in order to be perfectly distinct it is necessary that rays from different points in the object, even the most contiguous, should not mingle on the image, but that all the rays from each point on the object should be carried to its own point on the image—conditions which can only

be fulfilled by the arrangement found in the eye.

Defects of Vision may be due to affections of the nervous mechanism of the eye, to inflammatory and other changes in the transparent media through which the light passes, or to errors of accommodation or co-ordination. The optical mechanism of the eye and the D. of V. arising from defective refraction are discussed in the articles on *EYE* and *REFRACTION*. Pathological causes that produce defective vision are so numerous as to require the attention of specialists in medical practice. Tumours in the brain may cause impairment of function of part or the whole of the visual centre. Thus a lesion may cause *hemianopia* or half-blindness, one side of the visual field in each eye being affected. Toxic influences, such as that of tobacco, are usually responsible for *amblyopia*, in which the visual impressions are dimmed. Paralysis or inflammation of the optic nerve may cause total or partial blindness. *Glaucoma* is a condition of doubtful etiology; various visual defects are experienced, which may proceed quickly or gradually to total blindness. Inflammation of the transparent media leading to exudations naturally occlude the vision. *Keratitis*, or inflammation of the cornea, is the result of injury or is secondary to *conjunctivitis*. Opacity of the lens is known as *cataract*; it may be due to injury, to degeneration of the tissues in old people, or to altered nutrition. *Iritis* is a painful and dangerous condition dependent on a variety of causes, such as injury, constitutional disturbances of various kinds, extension of inflammation from other structures, etc. *Conjunctivitis* may be catarrhal or purulent; most varieties are contagious, hence the necessity for care in dealing with discharges from a diseased eye. When the two eyes are not co-ordinated, a condition of *diplopia*, or double-vision, exists; this is due to an affection of the oculo-motor nerves.

Colour Vision.—According to the Young-Helmholtz theory of colour vision there are three kinds of nerve fibres on the retina. When excited they produce the sensation of red, green, and violet respectively. A sensation of white is produced when the three types of nerves are excited to the same extent, while other colour sensations are produced by the excitation of the three kinds of nerves to different extents. The Young-Helmholtz theory is supported by the fact that if a person looks intently at a bright red light for some time

and then turns his gaze to a bright white surface, he sees the colours complementary to red. This is explained by the fact that the nerve fibres responding to the stimulus of 'red' become fatigued in the first operation and do not respond to the stimulus of the light from the white surface. This effect may be noticed when looking at natural objects; their shadows do not appear to be black, but the complementary colour of the natural object. Turner's paintings exhibited this phenomenon and his attitude was first defended by Ruskin in *Modern Painters*, whose views are generally supported to-day.

Colour Blindness.—See COLOUR-BLINDNESS.

Blind Spot.—This is the spot where the optic nerve enters the ball of the eye. Objects whose images fall on this spot are wholly invisible. It is for this reason that the point of entrance is always placed out of the axis, about one sixth of an inch on the nasal side; for if it were in the axis, the image of the object would fall on this spot and consequently disappear from view. The structural cause of the blindness of this spot is the absence of the bacillary layer—a layer of the retina composed of cylindrical rods, like pencils on end.

Erect Vision.—Retinal images are all inverted. External images or signs of objects are outward projections of retinal images. Yet we do not see them inverted owing to the 'law of visible direction,' which may be thus stated: 'When the rays from any radiant strike the retina, the impression is referred back along the ray-line into space and therefore to its proper place.'

Single and Double Images.—The preceding paragraphs proceed on the assumption that vision is monocular. The phenomena of binocular V. are less purely physical than those of monocular V. There being two retinae, there are two retinal images of every external object; and since retinal images are projected outward into space as external images, we must have two external images of every object. In fact, we see all objects double, except under certain special conditions. This can be proved by simple experiment, e.g. point with the forefinger at some distant object, looking with both eyes at the object, not the finger. Two fingers will be seen, one of them pointing at the object and the other far out of range, usually to the right. It is evident that when we look directly at anything we see it single, but that all things nearer or beyond the point of sight are seen double. But we see a thing single when the two

images of that thing are projected outward to the same spot in space, and are therefore superimposed and coincide. Under all other than these special conditions we see them double. The two external images of an object are thrown to the same spot and thus superposed and seen single when the two retinal images of that object fall on what are called corresponding points or identical points of the two retinae; if they do not fall on corresponding points of the two retinae, then the external images are thrown to different places in space, and therefore seen double. All the phenomena of binocular V. are explained by the 'law of corresponding points,' for the analysis of which the reader is referred to any text-book, such as Le Conte's *Sight*.

Horopter.—If we look at any point, the two visual lines converge and meet at that point. Its two images therefore fall on corresponding points of the two retinae, viz., on their central spots. A small object at this point of convergence is seen absolutely single. All objects beyond this, the point of sight, are seen double—in the one case homonymously, in the other heteronymously—because their images do not fall on corresponding points of the two retinae. But objects below or above or to one side or the other of the 'point of sight' may possibly be seen single also. The sum of all the points which are seen single while the point of sight remains unchanged is called the horopter. The nature and form of the horopter have given rise to much controversy. Helmholtz (*g.v.*), perhaps the most reliable authority, thinks that the horopter varies according to the position of the point of sight. His statement is that the horopter is a line of double curvature produced by the intersection of two hyperboloids, which, in some exceptional cases, may be changed into a combination of two plane curves; and that there is only one case in which the horopter is a plane, namely when the point of convergence is situated in the middle plane of the head and at an infinite distance. When we look straight forward at a point on the horizon, the horopter is a horizontal plane going through our feet; it is the ground on which we stand. When we look not at an infinite distance but at any point on the ground on which we stand which is equally distant from the two eyes, the horopter is not a plane, but the straight line which in one of its parts coincides with the ground. See J. Le Conte, *Sight: or Monocular and Binocular Vision*; 1883; J. H. Parsons, *Introduction to the Study*

of *Colour Vision*, 2nd ed., Cambridge, 1924; J. H. Parsons, *Introduction to the Theory of Perception*, Cambridge, 1927.

Visions, see APPARITION, SPIRITUALISM, THEOSOPHY.

Visit and Search. In international law the right inherent in all belligerents in time of war to stop private or mercantile vessels carrying the flag of a neutral state, and being within the territorial waters (see TERRITORIAL WATERS JURISDICTION) of the belligerent or his enemy, in order to ascertain whether such vessels are in fact neutral. Warships are not the subjects of this right. The right is exercised by sending an officer on board the suspected vessel to examine the register (see MERCHANT SHIPPING ACT), the log, invoices and charter-party and other ship's papers, so as to satisfy himself that both the character of the ship and the nature of her cargo are neutral. The late Mr. Hall states that Continental jurists are nearly unanimous in maintaining the exemption from V. and S. of *convoyed* ships as an established principle of law, but himself thinks the principle to be evidently inadmissible in authoritative international law, as well as inconsistent with the right of belligerents and disadvantageous in the long run to the neutrals themselves. From the Parliamentary Papers relative to the Declaration of London, it seems, however, that the British point of view yielded to the Continental doctrine that the 'neutral vessels under national convoy are exempt from search' (see also DECLARATION OF LONDON). Resistance to V. and S. justifies capture. If V. and S. are impracticable at sea, in view of the conditions of modern warfare, a vessel may be taken into harbour for the purpose. This practice was approved in the Great War by the British (the *Zamora*, 1916), Fr. (the *Federico*, 1915), and Ger. (the *Bertha Elizabeth*, 1915) Prize Courts. The U.S.A. Gov., however, protested, but the practice was continued until eventually neutral vessels found it convenient to make voluntary calls at British ports for the purpose of submitting to examination. See Parliamentary Papers Misc. No. 6 of 1915 and No. 15 of 1916. See also Birkenhead, *International Law*, 1927; Hall, *International Law*, 1924.

Visitation, Order of the, a religious sisterhood founded in 1610 by St. Francis de Sales. It follows the rule of St. Augustine, but at its formation had no special vows.

Visitation of the Blessed Virgin Mary, Feast of the, a festival held in the Western Church on July 2, to

commemorate the visit paid by St. Mary to her cousin Elizabeth.

Visitor, the officer or superior whose duty it is to visit a corporation, civil or ecclesiastical, in order to see that its rules and regulations are being observed, and that there is no serious default. The visitation of civil corporations is the work of the crown, which acts through the medium of the court of King's Bench. The bishop is the V. of his diocese; but, on account of the number of parishes, the visitation is usually left to the archdeacons. Vs. are also chosen for religious bodies and communities.

Vistula (Ger. *Weichsel*, Polish *Wisla*), one of the largest rivs. of Europe, rises in the Beskid Mts. (altitude 3675 ft.) in Austrian Silesia, and flows in a N.W. direction to Schwarzwasser, afterwards passing Cracow, whence it is navigable to its mouth at the Frisches Haff in the Baltic. Its chief tributaries are: on the right, the Drewenz, Ossa, Liebe, and San; and on the left, the Przemska, Pilica, Brahe, Ferse, and Radaune. Length 652 m.

Vital Statistics. The figures and comments set out below are taken from the Preliminary Report of the Registrar-General on the fourteenth census of the pop. of England and Wales, taken on April 25, 1931. The total pop. of England and Wales as at midnight on Sunday, April 26, 1931, was 39,947,931, 19,138,844 being males and 20,809,087 females. This total, the largest hitherto recorded, represents an areal density of 685 persons per sq. m., which density is greater than that of any other country in the world with the possible exception of Belgium.

The 1921-31 intercensal increase may be resolved into its more important elements as follows:

TABLE A.

Increase:	(In thousands)
Births in England and Wales	(+) 6,930
Decrease:	
Deaths in England and Wales	(-) 4,692
Balance, representing the excess of emigration over immigration (all types)	(-) 177
Net intercensal increase	(+) 2,061

For a comparison of these movements with those of preceding intercensal periods (1871-1931) see under REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES.

In the following table the movements of the current period are shown by calendar years, thus enabling the amount and direction of the several changes to be more precisely located.

figure which is but half, or less than half, that experienced prior to 1890 and only about two-thirds of that recorded in pre-War years. As a partial set-off against the decline in births, Table A shows that the deaths

TABLE B.
(In thousands.)

Calendar Year.	Births Registered.	Deaths Registered.	Excess of Births over Deaths.	*Outward Balance of Migration (- = Inward). Permanent Migration of British Subjects between England and Wales and countries outside Europe.
1921 (2nd half) .	414	221	193	34
1922 . . .	780	487	293	60
1923 . . .	758	445	313	99
1924 . . .	730	473	257	58
1925 . . .	711	473	238	49
1926 . . .	695	454	241	63
1927 . . .	654	485	169	53
1928 . . .	660	460	200	41
1929 . . .	644	532	112	43
1930 . . .	649	455	194	5
1931 (1st quarter) .	160	162	-2	-3

* The outward migration indicated by the figures in this column is to be discounted by an unknown inward balance of movement to England and Wales from Scotland, Ireland, and the Continent of Europe.

For a full discussion of all available migration statistics, reference should be made to the *Board of Trade Journal*. The comparative lowness of the latest pop. increase is shown clearly in Table A to be wholly due to the enormous reduction in the number of births during the past ten years. In spite of the fact that marriage-rates have been well maintained, particularly at the younger ages at which the bulk of births occur, and of the further fact that the exceptional post-War spurt in the birth-rate itself had only just passed its maximum at the beginning of the decennium, the total births registered in the 1921-31 intercensal period are more than a million and a quarter (16·3 per cent.) fewer than they were in the preceding period—a period which covered the War years when the birth-rate sank to levels never before recorded in England and Wales. They are between two and two and a half millions (25·4 per cent.) fewer than those of the last completely normal decennium, 1901-11. The almost unbroken fall in the birth-rate during the past ten years has reduced it to a level of 16·3 per 1000 pop., a

registered in the intercensal period were more than half a million fewer than those of either of the two preceding decennia. This numerical reduction of more than 10 per cent., which, if allowance be made for the increasing age and numbers of the pop. exposed to risk, represents a reduction in true mortality of more like 20 per cent. compared with the decennium 1911-21 (exclusive of deaths on active service), or 30 per cent. compared with the last pre-War decennium 1901-11, affords nothing but satisfaction, indicating, as it does, a definite advance in the general vitality of the nation as a whole. It is admitted in the Registrar-General's returns that the trend of the several movements is so regular that much of the future change can be anticipated in advance of the annual records. A forecast made in his department after the census of 1921 predicted an increase of pop. in the ensuing ten years of 5·65 per cent., a figure which differs from the recorded increase by only 0·13 per cent. It is upon such experience as this that statisticians are able to predict, with some degree of con-

fidence, the continued retardation of the pop. in the future and the attainment of a maximum figure somewhere about the middle of the present century.

Infant Mortality.—In England and Wales, in 1931, the birth-rate was 15·8 per 1000 pop., which is the lowest on record. It was 0·5 per 1000 below the previous lowest, recorded in 1929 and 1930. The death-rate was 12·3 per 1000, this being 0·9 above that for 1930. The infant death-rate was 66 per 1000 live births, or, six per 1000 above that for 1930, but only in 1928 and 1930 was this rate lower. The death-rate and the birth-rate draw closer to one another year by year. The birth-rate in Canada is about 25·3 per 1000 of pop. and the death-rate of infants under one year 79 per 1000 births; the figures for Australia are 24·6 and 57; France, 20 and 85; Belgium, 20·5 and 115; Italy, 27·3 and 126; Prussia, 23·9 and 129; Holland, 26·6 and 67; Norway, 23·7 and 56.

U.S. Vital Statistics.—The U.S. Census Bureau reports that for 1930 births in the U.S.A. (exclusive of Utah) numbered 2,190,047—a rate of 18·9 per thousand, the same as in 1929. In twenty-six states births were higher than in 1929; in twelve the rates were lower; and in seven they remained the same. New Mexico had the highest—28·5. Oregon had the lowest—14·1. Preceding birth-rates were as follows: 1924, 22·4; 1925, 21·5; 1926, 20·7; 1927, 20·6; 1928, 19·8. The death-rate in 1930 was 11·3, as compared with 11·9 in 1929. Thirty-seven states had lower rates than in 1929, six had higher rates and in two the rate did not change. The highest death-rate was for New Mexico—15·5. The lowest was for North Dakota—7·9. It should be noted that some states are not included in the above calculations, because their figures were not available at the time the report was published. The infant mortality per thousand was 64, the lowest since the establishment of the birth registration area in 1915. New York City had a birth-rate of 17·6, compared with 18·1 in 1929, and a death-rate of 10·8, compared with 11·3 in 1929; Chicago had a birth-rate of 17·1, compared with 17·7 in 1929, and a death-rate of 10·4, compared with 11·2 in 1929.

Vitalis, Ordericus, see ORDERICUS VITALIS.

Vitamins are accessory food factors essential to growth. Lunin (1881) discovered that animals could not be reared on adequate supplies of proteins, fats, carbohydrates, and mineral salts. Subsequently Sir

Gowland Hopkins (*q.v.*) established the presence of accessory factors in milk. For these Funk suggested the name *vitamines*, as he considered them to be amines. Although considerable research has been carried out, the chemical nature of the accessory factors is still undetermined and they have consequently been collectively named *vitamins*, and separately distinguished alphabetically as A, B, C, D, E.

Vitamin A, the fat-soluble V., occurs in cod-liver oil, fresh eggs, animal and fish fat, liver, green vegetables, tomatoes, germinating grain, fresh milk, cheese, and butter, and is destroyed by heating for six hours at 100° C. Deficiency of this V. results in diminished growth, xerophthalmia, and night blindness.

Vitamin B, the water-soluble, anti-neuritic V., is contained in yeast, legumes, unmilled cereals, eggs, milk, liver, nuts, green and root vegetables. Foods containing it may be dried, cooked, or preserved in tins (variable) without destroying the Vs. The result of deficiency of this V. was most marked in the outbreak of beriberi when the Japanese army was fed on polished rice. Pellagra and digestive troubles also result.

Vitamin C, the anti-scorbutic water-soluble V. occurs in fresh lemon and orange juice, tomatoes, green salad, rhubarb, radishes, and in small quantities in other fresh fruits and vegetables, germinating legumes, and milk. Boiling and drying greatly reduce the efficiency of the V., and consequently scurvy was for years prevalent in the British navy. In the sixteenth century lemon juice was recommended as a cure for scurvy.

Vitamin D, the anti-rachitic V., is more stable than A, prevents rickets and osteomalacia, and is present in irradiated ergosterol, cod-liver oil, germinating grain, fresh vegetables, butter, and milk.

Vitamin E, the anti-sterility V., occurs in wheat and other cereal embryos, yolk of eggs, fresh vegetables, lean meat, liver, and milk. It is very stable and has been proved to prevent sterility in both sexes, is essential to lactation, and promotes the utilisation of salts of iron.

The following foods are without V.: tinned, salted or potted meats, meat extracts, white fish, white flour, white cornflower, polished rice, pearl barley, tapioca, sago, vegetable margarine, lard, olive oil, tea, coffee, cocoa, sugar, jam, etc. Consult E. V. McCollum, *The Newer Knowledge of Nutrition*, 1919; R. H. A. Plimmer, and V. G. Plimmer, *Food, Health, and Vitamins*, 1929; J. Pryde, *The A B C of Vitamins*, 1929.

Vitebsk: (1) A dist. partly in White Russia and partly in the newly formed republic of Latvia. During the twelfth and thirteenth centuries an independent prov., but conquered by the Lithuanians in the fourteenth century. The area of the country is about 17,500 sq. m. The prov. is undulating and marshy, lakes being a typical feature of the physical structure. It is fertile: large crops of corn, rye, flax, and potatoes are raised. The timber trade is of great importance; and saw mills, flour mills, and paper mills provide employment for a great part of the pop. The greater part of the pop. are White Russians of the Orthodox Church, the remainder being made up of Letts, Poles, and Jews. Pop. 1,500,000. (2) A tn., cap. of prov. of same name, situated on the W. Dwina, about 73 m. N.W. of Smolensk. It is a cathedral tn., and boasts many fine churches. As a riv. port it is fairly important. It manufs. candles, tobacco, and woollen and linen cloth. Pop. about 109,000.

Vitellius, Aulus (A.D. 15-69), Rom. emperor, was a great favourite of the Augusti, Tiberius, Caligula, and Nero. He became the commander of the Rom. legions on the lower Rhine, being appointed by Galba, the successor of Nero. In A.D. 69 he was proclaimed emperor by the legions, with whose aid he defeated the supporters of Otho. His gluttony and ill-living made his reign short, and on the proclamation of Vespasian he was murdered in Rome.

Viterbo, a tn. in the prov. of Rome, Italy, about 41 m. N.W. of Rome. It is encircled by old Lombard walls, and contains Etruscan antiquities. Pop. about 31,800.

Viti Islands, see FLVI ISLANDS.

Vitis, a genus of creeping or climbing shrubs (order Ampelidaceæ) with small fragrant flowers followed by berries. *V. vinifera* is the vine (*q.v.*). A number of species are grown for their ornamental foliage on trellis work, pergolas, and walls; one of the finest is *V. coignetiae*, which has large handsome leaves that are beautifully tinted in autumn. A very hardy species is *V. labrusca*, fox grape, which bears heart-shaped purple or yellowish leaves, and has been of great value in raising new varieties of grape-vines on account of its resistance to Phylloxera.

Vitoria, or **Vittoria**, an episcopal city, cap. of Alava prov., N. Spain. Its cathedral dates from 1181. It is the site of Wellington's victory over the Fr. in 1813. It manufs. linen and cutlery. Pop. 37,000.

Vitrified Forts. Forts or camps found in many parts of Western

Europe and the British Isles; built of stone blocks, many of which seem to have been compacted together by fire. The two chief theories, put forward to explain the formation, are: (1) that they have been vitrified accidentally; (2) that they are the result of volcanic action. The former theory is substantiated to a certain extent, since the action of camp fires and watch fires may quite easily have caused the solidification. It must be remembered that this vitrifying process is observable only in places, and that much of the stone work that is found in these vitrified forts is loose. The volcanic theory has been practically disproved. The exact period when these forts were erected cannot be determined; but we have examples which date back to Rom. times, if not earlier. See Munro, *Prehistoric Scotland*, 1899.

Vitriol, from the Latin *vitrum*, glass, the name applied to certain metallic sulphates that form glassy crystals. Blue V. is copper sulphate, white V. is zinc sulphate, green V. (copperas) is ferrous sulphate. Oil of V. is sulphuric acid. See SULPHURIC ACID; COPPERAS; WHITE VITRIOL, etc.

Vitro-Varnish Painting, an art practised in Venice in the fifteenth century, but now almost lost. Varnish highly coloured for painting was mixed with 5 to 10 per cent. of burnt-glass powder, the resulting substance being applied with a fine brush (as in gesso-painting) to any surface. When dry the effect produced was that of glass in relief. Water-glass (a solution of sodium) may be used with the same result.

Vitruvius, or **Marcus V. Pollio**, a Rom. architect and writer, military engineer under Julius Cæsar in the African War (46 B.C.), and inspector of military machines under Augustus, to whom he dedicated his *De Architectura* (completed about 16-13 B.C.).

Vitry-le-François, an arron. and tn. of Marne dept., N.E. France, at the beginning of the Rhine-Marne Canal, called after its founder, Francis I. (1545). It trades in wine, grain, cement, wood, and iron. Faience ware is manufactured. Pop. 8000.

Vittoria, a tn. of Syracuse prov., Sicily, on the Camarino, founded (1605) and named after Vittoria Colonna. Trades in wine, soda, and ashes. Pop. (with Scoglitti) about 33,000. See also VITORIA.

Vittorio Veneto, a tn. of Treviso prov., Venetia, Italy, formed (about 1879) by union of the rival tns. Ceneda and Serravalle. Silk and cement are manufactured, and there are saline and sulphur springs. V. was captured in 1917 and retaken

by the Allied forces in Oct. 1918. Pop. 19,300.

Vittorio Veneto, Battle of. Fought Oct. 24–Nov. 4, 1918. This battle of the Piave line (Italy) brought about the rout and surrender of the Austrian forces during the Great War. The summer campaign of 1918 was very successful for the Allies, who had forced the Austrians back to W. of the Piave. The British force under Lord Cavan was on the left of the line. An advance was made during October which drove the Austrians back to the Livenza, and towards the end of the month the British were about Ramera. A further advance in a N.E. direction towards Sacile broke the Austrian line and separated the Austrians in the mountains from those in the plain. On the right the Italians recaptured the Asiago (*q.v.*) plateau and drove the enemy back to the Tagliamento, on the passage of which riv. an American regiment fought with gallantry and distinction (Nov. 3). From this time the Austrians were in full retreat. *See further* ITALIAN FRONT, OPERATIONS ON; WAR, THE GREAT.

Vitus, a Rom. saint who suffered martyrdom under Diocletian, and whose day is celebrated on June 15. His aid is invoked against St. Vitus's Dance (*Chorea*), hydrophobia, and other complaints.

Vivarini, a family of Italian painters, of Murano, Venice. The most prominent members were: *Antonio* (fl. mid-fifteenth century), the probable founder; *Bartolommeo* (fl. 1450–99), the pupil of Antonello of Messina, who taught him to paint in oils; and *Luigi* or *Alvise* (c. 1446–1502), a portrait painter.

Vivero, the cap. of Vivero dist. and seaport of Lugo prov., Galicia, N.W. Spain. Flax-weaving, fishing, and coasting-trade are carried on. It is on an estuary in the Bay of Biscay. Pop. about 13,120.

Viverra, or **Givet**, an old-world genus of cat-like carnivores. The genus contains the largest species in its family, and like most of its allies has a scent gland near the sexual organs from which the perfume *C.* is obtained. The animals are long and thin of body, and have long heads with sharp muzzles and short ears; the legs are short, the feet are small, hairy, with five digits and semi-retractile claws. In habit the *Cs.* are terrestrial, and their food consists chiefly of small vertebrates such as birds and reptiles. The penetrating odour of the *C.* makes it of value as a perfume, and the animals are often kept in captivity in order that it may readily be abstracted from them.

V. civetta, the only African species, yields the best known *C.* of commerce; *V. zibetha* is the widely distributed Indian *C.*

Vives, Juan Luis, more commonly known as **Ludovicus Vives** (1492–1540), a Spanish scholar and educationist, b. at Valencia. He became professor of humanities at Louvain (1519), and four years later was appointed tutor to Princess Mary of England, for whom he wrote *De ratione studii puerilis epistolae duae* (1523). Having opposed Henry VIII.'s divorce, he withdrew to Bruges. His works include *De Tradendis Discipulis* (see translation by Foster Watson, *Vives on Education*, 1913); *Linguae Latinae Exercitatio*, 1539; *De Causis Corruptarum Artium*, 1539; and *Tudor Schoolboy Life, the Dialogues of Juan Luis Vives* (Eng. trans. by Foster Watson, 1908).

Viviani, René (1863–1925), Fr. statesman, lawyer and orator, b. at Sidi-bel-Abbes, Algeria, Nov. 8. Practised at the Paris Bar. As Socialist deputy for Paris, he co-operated with Jaurès in opposing the extremist policy of Vaillant. He was conspicuous in demanding inquiry into the Dreyfus affair (*q.v.*). Entered the Cabinet in 1906 as Minister of Labour and Social Prévision. In 1914, just before the Great War broke out, he was premier and Minister for Foreign Affairs, succeeding, where Ribot had failed, in forming a strong Ministry. A remarkable orator, albeit of pronounced atheistic views, he made electrifying patriotic speeches in the Chamber in the early days of the war. Succeeded in 1915 by Briand (*q.v.*), under whom he was Minister of Justice. After the War he took part in the Washington Conference, 1921. Chevalier of the Legion of Honour. Died Sept. 7.

Vivien, or **Viviane**, a beautiful enchantress of the Arthurian legend, mistress of the famous sorcerer Merlin, over whom she cast her spell, depriving him of his power and imprisoning him in a thicket of thorn. Her palace was in the midst of a magical lake, hence she is sometimes called the 'Lady of the Lake.' *See* Tennyson, *Idylls of the King*; Dunlop, *Hist. of Prose Fiction*, 1.

Vivien de Saint-Martin, Louis (1802–97), a Fr. geographer, b. at Caen. He pub.: *Carte Electorale*, 1827; *Tables Chronologiques* and *Géographie de France*. He translated the works of Sir Walter Scott (1836–39), and was the author of *Histoire de la Révolution Française* and *Histoire de Napoléon*. His two masterpieces are the *Nouveau Dictionnaire de Géographie universelle*, and *Atlas Universel* to illustrate his *Histoire de la Géographie*.

Vivisection, the dissection of, and experiment upon, living animals. **V.** is an ancient practice, Galen being one of its exponents. It is claimed that by **V.** alone was it possible to discover much physiological and pathological knowledge, e.g. the circulation of the blood and the value of therapeutics. This, however, is denied by many, who say that nothing has been discovered with the aid of **V.** that could not have been discovered without it. So the arguments developed, until in 1876 a royal commission was appointed to investigate the problem. This was followed by an Act which provides inspectors to visit registered places where **V.** is allowed—and then only for a useful purpose, or in very limited cases for the purposes of instruction—by persons who must possess a licence issued by the Home Secretary. See the publications of the Anti-Vivisectionist Society. See also annual returns, pub. by H.M.S.O., *Experiments on Living Animals*, 1926-30. See further under **ANTI-VIVISECTION**.

Vivonne, Catherine de, see **RAMBOUILLET**.

Vizagapatam, the cap. of a dist. of the same name in Madras, India, situated on the E. coast, N. of Dolphin's Nose. The European quarter is in the suburb Waltair. Manganese ore, native cloth, ivory, and rice are exported. **V.** is the natural outlet of the Central Provs., and is developing rapidly. It was declared a major port in 1925, and the Bengal-Nagpur Railway is enlarging and improving the harbour. It is hoped that the improvements will be completed by 1934. Pop. 41,000. In the dist. of **V.**, rice, sugar-cane, tobacco, and cotton are grown. Area 17,222 sq. m. Pop. 3,000,000.

Vizetelly, Henry (1820-94), an Eng. publisher and pioneer of the illustrated Press, was b. in London of Italian extraction. He started the *Pictorial Times* (1843), and the *Illustrated Times* (1855), and became Paris correspondent to the *Illustrated London News* (1865)—afterwards publishing *Paris in Peril* (1882), an account of the siege. He established a publishing firm in London (1879), which issued translations of Fr. novels. He translated most of E. Zola's novels, for which he was prosecuted. See his *Glances Back Through Seventy Years* (1893).

Vizeu, or **Viseu**, the cap. of Vizeu prov., Beira, Portugal. 50 m. from Oporto. It has a twelfth-century cathedral and remains of the Rom. Campo de Viriato near by. There is an annual fair in Sept. Pop. about 8100.

Vizianagram, or **Vizianagaram**, a fortified tn. of Vizagapatam dist., Madras, British India. It has a military cantonment and is the residence of a 'zamindar.' There are fine buildings, including a college. Pop. 31,100.

Vizier (Arabic *Wazir*), a title first given to the chief minister of the Abbasside caliphs, and since spread among most Oriental nations.

Vladikavkaz, the cap. of Terek prov., North Caucasian area, Russia, on Terek R. and N. slope of the Caucasus, 50 m. from Mozoook. It is an important military station with active trade. Pop. 79,300.

Vladimir, a tn. formerly in a prov. of the same name, now in the Ivanovo Industrial Area in the Russian S.F.S.R. It is situated on the R. Kyzina and is an important riv. port. It has dye works and cotton mills. It was once the seat of an archbishop and contains many fine churches. Two of these churches, those of St. Demetrius and of the Nativity, date back to the twelfth century. Pop. 35,000.

Vladimir I., Grand Duke of Kief, called also St. Vladimir and Sunny Vladimir (980-1015), a warrior prince of Russia who at the head of a band of Vikings collected principally in Scandinavia did much to establish a strong duchy. **V.** was converted to Christianity and became a member of the Gk. Church, thus giving practically national sanction to the religion which is still retained by Russia. In this way he became the 'hero' of the monks.

Vladivostok, the principal city of the Far Eastern Area, Asiatic Russia, and an important naval port on the Pacific. It is the eastern terminus of the Trans-Siberian Railway. It is a garrison tn. and the pop., 108,000 (1926), is made up of Chinese, Koreans, and Russians.

Vlissingen, see **FLUSHING**.

Vocational Training covers those schemes of education which aim at preparing the young for industrial and commercial pursuits. They are adopted by mun. education committees either by special day-training schools, sometimes called trades schools, or by special evening classes in connection with technical evening classes (see **TECHNICAL EDUCATION**). Other institutions include day continuation schools, which are equipped with special rooms primarily for mechanical and trade education for boys who have just left school, and who work on a part-time arrangement. Many employers arrange for entrants to their works to spend part of the working day at these institutions. But other business organisa-

tions have their own schools, and much money and care are expended in their administration, particularly in England and Germany, where the schools are called 'works schools.' It is admittedly an economic advantage that a recruit should arrive at his destined bench as fully skilled as V. T. can make him. There are also V. T. centres for serving soldiers, where training is given to selected men during the last few months of their colour service. The existing Army V. T. centres are at Chisleton, Hounslow, and Aldershot. The system is highly organised in the U.S.A., and V. T. schools in that country are under the guidance of the National Society for the Promotion of Industrial Education, which was formed in 1906. The Federal Gov. gives state aid to public schools which organise V. T., with the proviso that commercial subjects be excluded. The Young Men's Christian Association develops a scheme of trade apprenticeship on similar lines. The movement has increased generally and the numbers of pupils enrolled since the inauguration of the movement have increased six-fold. Consult Allen, *Vocational Training and Democracy*, 1925.

Vodena, or Vodina (anct. *Edessa*), an archiepiscopal see and tn. of Salonika vilayet, Rumelia, European Turkey, 40 m. from Monastir. Tobacco, cotton, wool, and leather are manufactured. There is trade in red pepper, silk cocoons, and wine. Pop. about 25,000.

Vodka, Russian brandy, the national spirituous drink of Russia. Originally it was distilled from rye, but maize and potato spirit are often used. It contains about 50 per cent. of alcohol, and has such a strong flavour that it does not recommend itself to people other than Russians. Its sale was prohibited during the Great War. The effects of V. drinking among those who cannot purchase spirit of good quality constitute one of the social problems of Russia. An effort towards enforcing prohibition failed (1917).

Vogel, Sir Julius (1835-99), a Eng. colonial statesman, b. in London. Settled in Victoria in 1851 as a journalist, and in 1861 tried his fortunes in New Zealand. He entered the Provincial Council of Otago in 1862, and in 1866 was at the head of the provincial gov. His great life work was to revive the fortunes of New Zealand after the disastrous war between the North and South Islands of 1866-70. He negotiated a loan with England of over £20,000,000, and thereby developed the natural resources of the colony, and attracted a great influx of immi-

grants. He also rendered valuable services in the New Zealand telegraph and postal arrangements, in railway development, and also in colonial defence. He d. in England.

Voghera (anct. *Iria*), a tn. of Pavia prov., Lombardy, N. Italy, 16 m. from Pavia, on the Staffora. Silk, corn, and wine are produced. Pop. 20,640.

Vogler, Georg Joseph, the Abbé (1749-1814), a Ger. organist and composer, b. at Würzburg of musical parents. Studied music and theology and was ordained priest (1773); founded a school at Mannheim, where he met Mozart. Travelled widely (1780-99), probably visiting England. Founded schools at Stockholm and Darmstadt. A great extempore organist. Browning made him the subject of a poem (*Abt Vogler*).

Voice and Voice Training. Voice is the production of sound by means of vocal cords or membranous reeds situated in the larynx. The pitch of a voice varies with the size of the larynx—the smaller the larynx the higher the pitch. There are six distinct types of voice, classified according to timbre (*i.e.* quality of tone) rather than to pitch—(*male*) bass, baritone, tenor, and (*female*) contralto, mezzo-soprano, and soprano, the latter approximating to a boy's treble. Middle female voices should be classified as mezzo-soprano and mezzo-contralto. The male baritone is of bass timbre, although higher in pitch. Most voices have a compass of approximately two octaves, less commonly of three; but the tone-quality of a voice is not consistent throughout its compass. The upper 'register' (*i.e.* series of notes of similar quality), or 'head' voice (*voce finta*), as opposed to the lower register or 'chest' voice (*voce piena*), demands a different process of production. In head voice, the pitch is raised by gradually relaxing and shortening the vocal reeds, in chest voice by increasing both tension and length, the variations in length being in both cases infinitesimal. There is no physiological justification for the commonly accepted division of the voice into three registers, head, medium, and chest. The transition from one register to another must be made without violent change of timbre; the successful accomplishment of this, as of almost everything else in singing, depends principally on correct breathing. Especially should a singer refrain from producing head notes with the chest and *vice versa*, and, as the registers overlap to some extent, this is practically unnecessary. In breathing, the chest should be raised and the

abdomen drawn inwards, breath being taken through the nose and released as gradually and economically as possible. The vibrations caused by the passage of air through the vocal cords should be 'placed,' or focused on that part of the roof of the mouth which adjoins the upper front row of teeth (i.e. the frontal hard palate). There is the widest divergence of opinion as to the correct poise and shape of lips, etc.; generally speaking, however, unnatural positions and muscular tension should be avoided.

The Speaking Voice.—The use of the voice in song and in speech is dependent on the same physiological principles. The four factors of vocal tone are: the breath; the note; the tone; the articulation. Speech is acquired entirely through the ear, and its musical elements remain under the control of the ear. Inimitating the sounds we hear we develop the automatic power of making audible movements, and these movements give us a feeling of right speech. We have an auditive and a kinesthetic element in speech. Breathing for the speaking voice needs to be even more easy and controlled than for song. We need very flexible movements of the chest muscles and a definite but not an excessive descent of the floor of the chest. The note is produced by the outgoing air vibrating the two small membranes called vocal cords. In speaking, the note is constantly gliding up and down the scale; in song it moves by quick steps and its pitch and duration are exactly measured; it is therefore essential to train the speaking voice by using the singing voice, so that the ear may grow to appreciate differences of pitch and musical quality. The range of the speaking voice is roughly from A to A in women, and an octave lower for men. If this scale is practised gently downwards in a singing tone so as to avoid all shock and with careful breath control as in singing a marked improvement will result. By tone we mean not only the general good qualities of purity, equality, and volume, but the tone which is individual to any one instrument and never separated from it—specific tone. In the speaking voice this tone appears as a vowel sound. The vowels result from the resounding of the air in the neck, throat, and mouth. They can be whispered without voice, when they will be found each to have a specific pitch. For the vowel sounds, see under PHONETICS. Vocal strain is due to one of four causes: (1) general fatigue, particularly after cold or any throat trouble; (2) the constant employment of a hard click very common between two vowel sounds, as in India and Asia; (3)

throaty quality due to tight tongue and throat position; (4) feeble front articulation, which throws back too much work on the throat and is generally accompanied by great monotony and mumbling. See A. Randegger, *Singing*, 1878; A. B. Bach, *The Principles of Singing*, 1885; W. Ripman, *Phonetics, English, French, and German. Trans. and adapted from Prof. Victor's 'Kleine Phonetik.'* 1899; E. White, *The Voice Beautiful*, 1918; Sir Richard Paget, *Human Speech*, 1930; W. W. Shaw, *Voice Production*, 1930; T. H. Pear, *Voice and Personality*, 1931; Blanche Marchesi, *A Singer's Catechism and Creed*, 1932.

Voiron, a tn. of Isère dept., France, on the Morge, noted for cloth manufs. Silk, paper, straw, tools, and chemicals are also manufactured. It formed part of Savoy till 1355. Pop. 11,900.

Volapük, one of the earliest artificial languages, was invented in 1879 by Johann Martin Schleyer, a pastor of Constance, Baden. The word is coined from *world* and *speak*. The vocabulary of V. is borrowed from Latin, the Romance languages, and chiefly from Eng. It is inflectional, the grammar and syntax being partly borrowed and partly original. It was taken up by educationists and spread to Paris (c. 1885), and in 1887 was recommended by the London Philological Society for international diplomatic and scientific use. Consult Sprague's *The International Language: Handbook of Volapük*, 1888; and similar works by Schleyer, Kerchoff, and Harrison.

Volcanoes. A V. is a vent in the earth's crust from which lavas and ashes, etc., are ejected. If the vent is in the form of a fissure it is not commonly called a V. The term V. is generally restricted to those conical mountains which are built up by material ejected from a fissure by means of a central throat or pipe. At the top of the cone is a pit-shaped opening called the 'crater.' An ideal section of a V. would show that the cone was built up of layers of lavas and ashes, these layers being built up around the central pipe by off-repeated eruptions. Vs., however, exhibit two great types of eruption: (1) the explosive type; (2) the quiet type. In the former the materials are ejected with explosive violence, while in the latter the lava rises up into the crater and flows over the rim or breaks through the sides. Of the first type we may mention Stromboli. The cone of this V. is built up from the bottom of the Mediterranean Sea, and is about a mile high, although little more than half projects above the water. Steam issues

constantly from an opening about 1000 ft. from the top. In the floor of the crater are cracks in which lava may be seen in constant ebullition. Fragments of the lava are occasionally hurled into the air. The best-known V. is probably Vesuvius, near Naples. Previously to A.D. 79 Vesuvius was only a conical mountain with a deep crater about 3 m. in diameter at the summit. In that year a most destructive explosion occurred, preceded by several violent earthquakes, and the tns. of Herculaneum and Pompeii were buried in the dust which fell. By this explosion a large part of the walls of the crater was blown away; the part left standing constitutes the crescent-shaped elevation known to-day as Monte Somma. During the eruptions of A.D. 79 no lava was emitted. Since this outburst, Vesuvius has had other violent eruptions separated by periods of quiescence. As a general rule the longer the period of quiescence, the more explosive is the following eruption. Important eruptions have taken place in 1737, 1794, 1822, 1872, and 1906. The cumulative effect of all these outbursts by which lavas and ashes have been ejected has been to build up a newer cone and crater within the broken ring of Monte Somma. Smaller volcanic cones exist in the Phlegrean Fields near Naples, and these, nearly extinct, discharge only carbon dioxide and sulphurous gases. This stage is known as the solfataric stage. The eruption of Krakatoa, between Java and Sumatra, which took place in 1883, after a period of 200 years' quiescence, was an eruption of extremely explosive violence. As a result of this outburst the whole of the northern and lower part of the island disappeared, and half of the cone of Rakata was blown away. The ashes were projected some 200 m. into the air, and were carried all round the world, causing most brilliant sunset effects in many places. Enormous sea waves were caused which travelled half-way round the earth and which did inestimable damage to the coasts near the island. The cause of the eruption is attributed to the sudden escape of superheated steam. In 1902 two eruptions occurred in the islands of St. Vincent and Martinique in the W. Indies, the phenomena being practically the same in both cases. The V. La Soufrière, in St. Vincent, contained a crater lake smelling strongly of sulphurous gases. After premonitory warnings in the shape of earthquake shocks, the crater lake boiled over, and the next day a huge cloud of incandescent dust rolled down the

mountain side, destroying everything in its path. Similarly, in the eruption of Mont Pelée, a cloud of incandescent dust descended upon the tn. of St. Pierre, which was blotted out in a moment, and 30,000 of the inhabitants killed. In the Hawaiian Islands the volcanic eruptions are of the quiet type. Mauna Loa is the largest of four volcanic cones in the island of Hawaii, and is 14,000 ft. above the sea. During an eruption the lava flows out from fissures in the side of the mountain in streams which are sometimes half a mile in width, and flow for 50 m. Little steam is discharged and there are no showers of dust or explosive reports. In Iceland three types of eruptive vents are considered: (1) cones built of ash and lava; (2) cones built of lava alone; (3) chains of craters. The first two correspond to the Vesuvian and Hawaiian types. The third type is common in Iceland. Volcanic cones are arranged along fissures running S.W. and N.E. Enormous floods of lava are often emitted from these crater chains as in the eruption of Laki in 1783, when two streams of basalt lava with maximum widths of 15 m. and 7 m. flowed for a distance of 50 m. Eruptions which are strictly not from Vs. are those described as fissure eruptions. These are lava flows which cover thousands of square miles, and are known in the basin range of N. America (Snake River plains), in the Deccan plateau of India, and in the basalt plateau of N.W. Europe. Regarding the occurrence of Vs., it is found that though a few occur isolated, yet as a rule they are met with in extended lines within comparatively short distance from the sea, and are usually situated on important lines of fracture, i.e. generally where the surface of the earth's crust is steepest. The lines of Vs. are generally parallel to the shores of the continents, and they form a complete 'Girdle of Fire' round the Pacific Ocean. From the southern extremity of the continent of America, active Vs. extend through the Andes, through Mexico and California, to Alaska, then through the Kuriles to Kamchatka, and thence through Japan and the Philippines, Papua, New Caledonia, New Zealand, and the Antarctic continent. Another line of Vs. runs through Java and Sumatra to the shores of further India. The Atlantic Chain embraces the Vs. of Iceland, the Azores, and the Canaries, and another line is formed by the Vs. of the Mediterranean. Extinct Vs. also occur in many other regions. The agents concerned in causing volcanic eruptions are superheated waters or their component

gases. The water is regarded as contained in the molten magma under extremely high pressure, and the eruptions are caused by the sudden expansion of large volumes of steam, which escape along lines of weakness. Intimately associated with Vs. are Geysers (*q.v.*). For reference see Judd's *Volcanoes* and F. v. Wolff's *Der Vulkanismus*, 1914; also works on the subject by Scrope and Daubeny. See also Chamberlin's, Salisbury's, and Geikie's textbooks of geology. See AGGLOMERATE, BOMB, LAVA, etc.

Volci, or Vulci, an anct. Etruscan city, situated some 55 m. N. of Rome, Italy. Its inhabitants were defeated by Coruncanius in 280 B.C. Since 1828 excavations have been made and in its necropolis Gk. bronzes and painted vases have been found.

Vole, a name given to various species of rodents. The water V. or water rat (*Arvicola amphibius*) is about 1 ft. long from nose to tip of tail. Its fur is thick and shining, rich reddish brown above and yellowish grey beneath. Its feet are not webbed, although it takes readily to water. It feeds chiefly on the stalks of sedges and other aquatic plants, and is of service in helping to keep water-courses clear. By some authorities the term meadow mouse has been substituted for those rodents known as the field V. (*Microtus agrestis*), the rank or red V. (*Erotomys glareolus*), and the Orkney V. (*Morcadensis*). The field V. periodically occurs in swarms, and has caused heavy losses to crops.

Volga, The (the *Rha* of the ancts.), the longest riv. (2325 m.) and one of the chief waterways of Europe. It lies entirely in Russia, and rises in the Valdai Hills of Tver, eventually reaching the Caspian Sea at Astrakhan by as many as 200 mouths. The main directions from the source are E., S. (from Samara), and from Tsaritsyn S.E. After the Oka (from the S.) and the Kama (N.), both of which are longer than the Rhine (760 m.), the chief tributaries are the Sheksna, Unzha, Vetluga, and Akhtuba. The affluents together are navigable for as many as 20,000 m., whilst the main stream is navigable to within 65 m. of its source. The first commercial ports on the V. are Astrakhan, Tsaritsyn, Rybinsk, Nijni-Novgorod, and Saratov; whilst Tver, Yaroslav, Kostroma, Kazan, and Samara are also on its banks. In spite of the fact that it is ice-bound from 90 to 160 days each year, this riv. is the great artery of commerce for the products of northern and central Asia as well as of Russia. Canals have opened up communication with Leningrad, Riga, and Archangel.

Volhynia, a prov. of the Ukraine. The surface is, on the whole, quite flat, but in the W. the country is given a hilly appearance by a spur on the Carpathians. The pop. is over 4,200,000. The area is roughly 28,000 sq. m. Timber provides the chief occupations of the inhabitants, who are principally Little Russians.

Volition, see WILL.

Volksrust, the centre of an agricultural dist., close to the N. boundary of the Transvaal, 175 m. S.E. of Johannesburg. Pop. 3000.

Volney, Constantin François Chassebœuf, Comte de (1757-1820), a Fr. philosopher, b. at Craon in Anjou. V. travelled in Egypt and Syria (1782-86), and after his return pub. *Voyage en Egypte*. Elected member of the National Assembly, Constituent Assembly, and the Convention. He suffered imprisonment, but regained liberty on the overthrow of Robespierre, and soon after was appointed professor of history at the Ecole Normale. His famous work is *Les Ruines, ou Méditations sur les Révolutions des Empires*, 1791. See Sainte-Beuve's *Causeries du Lundi*, and a monograph by Berger.

Volo, a seaport on the Gulf of Volo, with a museum of antiquities, in Thessaly, Greece. Pop. 25,000.

Vologda, a tn. in N.E. Russia, on the Vologda. There is considerable commerce in linseed, flax, oats, and dairy produce. Pop. (1926) 58,000.

Volpi, Gian Antonio (1686-1766), an Italian classical scholar, was professor of philosophy and rhetoric at the university of his native city of Padua. Joint-owner of a printing press with Gaetano, his brother, he brought out editions of Catullus (1737) and Tibullus and Propertius, besides a treatise on Rom. satire (1744).

Volsci, an anct. Italian people of E. Latium, akin to the Oscans and Umbrians, dwelling on both sides of the Liris down to the Tyrrhene Sea. They were at war with the Roms. in the fifth and fourth centuries B.C. and often allies of the Æqui, but were subdued (338) and made Rom. citizens by 304. Coriolanus defeated them at Corioli (c. 490 B.C.). The Hernici dwelt E., the Aurunci and Samnites to the S. Among their tns. were Antium, Satrium, Arpinum, Norba, and Velitæ (Velletri), birthplace of Augustus.

Volstead Act (U.S.A.), named after J. Volstead (b. 1860) who secured its passage through Congress. This Act was the initial move in the fight to enforce the 18th Amendment to the American Constitution regarding Prohibition (*q.v.*). The Act was passed over the veto on October 18, 1919.

It defined what was meant by liquor under the amendment and stipulated what Congress chose to forbid.

Volsungs, a heroic race (prominent in old Germanic and Norse sagas), the founder of which was Volsung, the grandson of Odin. See Morris, *Story of Sigurd the Volsung*, 1898.

Volt, the practical unit of electromotive force (E.M.F.) in electricity, so called after Alessandro Volta (q.v.). In Eng. it was defined by order in council (1894) as having 10⁸ absolute units in the C.G.S. system; and as being that electrical pressure which, when applied to a conductor whose resistance is 1 ohm, will produce a current of 1 ampere. It is represented by 0.6974 of the pressure between the poles of a Clark cell at 15° C. The voltage of a system simply means the difference of pressure exerted on the system measured in volts.

Volta, Alessandro, Count (1745-1827), an Italian physicist, noted for his discoveries in electricity. He became professor of natural philosophy at Pavia University (1774-1804); at Padua (1815), retiring 1819. V. travelled in Switzerland (1777), through Tuscany (1780), in Germany, Holland, and England (1782), where he met Banks and other distinguished men. He invented the electrophorus, an electrical condenser (1782), and the hydrogen lamp (1777). His most noted discovery was, however, that of the development of electricity in metallic bodies (see *Phil. Trans.*, 1793); repeated experiments leading to the invention of an electrical battery, and later of the 'Voltaic' (or Galvanic) pile (see *Phil. Trans.*, 90, 1800). A collection of his works was pub. in 1816. See Bianchi and Mochetti, *Vita*, 1829-32; Volta, A. *Volta*, 1875. Cf. ELECTRICITY; GALVANI.

Voltaic Cell, see CELL, VOLTAIC.

Voltaire, Jean François Marie Arouet de (1694-1778), a sceptic, dramatist, and historian, b. in Paris, his father being an official in the Chambre des Comptes; educated at the Jesuit Collège Louis le Grand. At an early age his precocity won him the support of Ninon de l'Enclos; and by the age of eighteen his literary abilities had gained him entrance into the most brilliant intellectual circles. In 1715 he was banished, and on his return in 1717 imprisoned in the Bastille for writing a scurrilous lampoon on the Regent. He had already written the tragedy *Œdipe*; and on his release in 1718 it was performed with brilliant success. He now assumed the pseudonym of 'Voltaire,' an anagram of Arouet l(e)j(eune). In 1723 the poem on Henri IV., which had been censored in Paris for its anti-papery, was printed at Rouen;

the following year the play *Marianne* was produced. About this time another court quarrel resulted in further imprisonment until 1726, when he was exiled to England. Here, as the protégé of Bolingbroke, he was welcomed in circles of intellect and became versed in Eng. politics, literature, and philosophy—the latter especially stimulating his scepticism. On his return to Paris (1729) he realised a fortune by speculation; and in 1734, threatened with arrest for his *Lettres Anglaises* (pub. without his authority), he retired with his mistress Madame du Châtelet (and her *mari complaisant*!) to her château at Cirey, Champagne. By this time he had already produced the *Lettres Philosophiques*, *Histoire de Charles XII.*, and *Épître à Uranie*. At Cirey he wrote the plays *Alzire*, *Mérope*, and *Mahomet*; the poetical satire *La Pucelle*; *Treatise on Metaphysics*; a thesis on Sir Isaac Newton; part of *Siècle de Louis XIV.*; *Les Mœurs et l'Esprit des Nations*; *Zadig*, and other eastern tales. In 1746 he was elected to the Academy. Meanwhile, V. had become the intimate correspondent of Frederick the Great. Madame du Châtelet died in 1749, and the following year V. visited Frederick at Berlin. Here he was entertained in great style, his chief occupation being to correct his patron's writings; but a disparity of temperament led to V.'s departure in 1753. The *Siècle de Louis XIV.* was completed about this time. From 1755 onwards, V. spent his time at Ferney, near Geneva, beginning his anti-Christian writings in 1762. Other works of the period include *Candide*, the *Dictionnaire Philosophique*, histories of Peter the Great, of India, and of Louis XV., the *Treatise on Toleration*, and *Irène*—the last being performed with triumphant success on V.'s return to Paris in 1778. Although he attacked Christianity, he also attacked the fashionable atheism of his time, and in his famous cry *Ecrasez l'infâme*, he probably referred, not specifically to God, Christ, or Christianity, but to persecution and oppression by any pampered orthodoxy. V. is often thought of as an atheist, but was more probably an agnostic. Some even aver that he was a deist. He certainly favoured religion for the crowd whose intellectuality he despised. All his life he hated injustice and devoted much time to the defence of the wrongly accused as in the famous Calas case. He was one of the most voluminous letter writers who ever lived. Some 12,000 to about 700 correspondents are extant and are a mine of information about the eighteenth century. A new ed. of the *Œuvres complètes de V.*

is in progress (Paris 1930-). Eng. biographies are by Hamley (1877), Parton (1881), Morley (1886), and Espinasse (1892). See also J. C. Collins, *Voltaire in England*, 1908; G. Lawson, *Voltaire*, 1906; R. Aldington, *Voltaire*, 1925; A. Bellesort, *Essai sur Voltaire*, 1925; M. M. H. Barr, *A Century of Voltaire Study. A Bibliography*, 1929; C. E. Vulliamy, *Voltaire*, 1930; *Correspondence of Catherine the Great with Voltaire*, 1931.

Voltmeter, an electrical instrument employed for measurement of currents by means of the amount of decomposition which the current effects in an electrolyte in a given time.

Volterra, an episcopal see of Tuscany, in the prov. of Pisa, Italy. Many valuable Rom. and Etruscan reliques are in its museum. The chief manuf. is alabaster. Pop. 14,000.

Voltmeter, an instrument for measuring electrical pressure in volts. The instrument is connected to the two points between which the pressure is required, and hence should have a relatively high resistance so that the introduction of the instrument may not sensibly disturb the distribution of the current. Vs. in general use are classified as electro-magnetic and hot wire instruments. Of the electro-magnetic type, the *moving coil voltmeter* is a modification of the D'Arsonval galvanometer. It consists of a coil working in jewelled centres and having hair-spring controls. Inside the coil a soft iron cylinder is mounted. The coil and the cylinder are placed between the poles of a permanent horse-shoe magnet, thus ensuring a uniform field of force for the region in which the coil rotates. When a current is sent into the coil, electro-magnetic action takes place and the coil rotates, the amount of rotation being proportional to the current. This type of instrument can only be used for continuous currents. Another electro-magnetic type of instrument is the *moving magnet voltmeter*. This depends on the fact that a piece of soft iron always tends to move to the strongest parts of a magnetic field. The amount of this motion depends on the strength of the field. If the field is produced by a current, the strength is proportional to the current. For this type of instrument a piece of soft iron is placed in a field due to a current and the amount of movement is measured. The amount of this movement is proportional to the intensity of the current. This instrument may be used for direct or alternating currents. In the *hot wire type*, measurement depends upon the elongation of a wire under the in-

fluence of heat. One of the effects of an electric current passing through a wire is to heat it, the elongation thus produced affording a means of measuring the current. The great defect of Vs. of this variety is that the pointer does not indicate at once the value of the current owing to the fact that the wire takes time to attain its maximum temperature. They may be used for continuous or alternating currents. Another type of instrument is the *electrostatic V.* introduced by Kelvin. In principle it closely resembles the quadrant electrometer. It consists of a pivoted aluminium needle, which can oscillate between two plates which are placed on opposite sides of it. The needle and the fixed plates are connected to the two points between which the pressure is required. This charges the plates and needle to different potentials and thus causes the needle to move, the amount of movement being proportional to the square of the potential difference. The instrument may be used for both continuous and alternating currents. Another important feature is that no current flows through the instrument, which thus more strictly registers volts than any instrument which does use current.

Volumenometer, see SPECIFIC GRAVITY.

Volumetric Analysis, see ANALYSIS, CHEMICAL.

Volunteers (Naval and Military). The volunteer movement originated at the end of the eighteenth century when France was threatening England. Volunteers were first enrolled to augment the militia, but gradually they became segregated into separate corps. They enlisted for home service only. These corps were disbanded about 1805, were again revived during the Peninsular and Waterloo campaigns and again disbanded. France's attitude towards England in 1859 led to a resuscitation of the movement and numerous corps were formed. In 1908 these became the Territorial Force (now the Territorial Army), and all units served overseas during the Great War with considerable distinction. At the commencement of the War service overseas was optional, but all agreed to undertake such service. Since the War men enrol for 'General Service.' From 1908 Territorial Army units have been gradually welded into the regiments to which they belong and now the process is complete. See TERRITORIAL ARMY.

Volunteers of America, a non-sectarian philanthropic association founded by General Ballington Booth in 1896 as a corporation under the laws of the state of New York. The

corporation co-operates with the evangelical churches, and does valuable relief work in numerous cities in conjunction with the gospel mission work. It has some sixty homes or institutions in various parts of the U.S.A., and organises a number of summer camps.

Volusenus, Florentius (Florence Wilson or Wolsey), a Scottish humanist who lived in the first half of the sixteenth century. Educated in Aberdeen and at the University of Paris, where he early showed a preference for classical learning. For a time he was tutor to a son of Cardinal Wolsey, and afterwards occupied a scholastic position on the Continent. He *d.* in 1546 while on his way to Scotland.

Volvulus, a twisting of the intestine causing occlusion of the passage. It may take place by the gut twisting upon itself or by the formation of a loop. It occurs most often in the sigmoid flexure, and is preceded by a period of constipation. The symptoms are severe localised pain, absolute constipation, and distension of the abdomen. Surgical interference is the only treatment possible.

Vomiting, a reflex act by which the contents of the stomach are violently ejected through the cardiac orifice, up through the œsophagus, and out of the mouth. It is caused by the presence of irritating substances in the stomach, and under such circumstances is a protective effort of the organism. It may, however, be produced by a variety of different causes: by certain drugs; by diseases such as peritonitis, gastric ulcer, constipation, kidney disease, liver disease, consumption, etc.; by certain visual, olfactory, or other sensations; or by reflex nervous stimuli, as in the 'morning sickness' of pregnancy, which originates in the pelvic region. Opium and morphia are useful when the central nervous system is concerned; in cases of stomach irritation, bismuth, ice, carboic acid, or creosote should be administered. *See also* SEA-SICKNESS.

Voodooism, a primitive form of fetish-worship supposed to have been brought from Africa into America and the W. Indies by the negro slaves when they were imported. It consists in the worship of a certain serpent, and the terrible nature of the rites has been much exaggerated. The derivation of the name Voodoo is unknown.

Vorarlberg, the westernmost dist. of Austria. With Tyrol it forms a prov. 1000 sq. m. in area. V. is bounded N. by Bavaria, W. by the Rhine, Liechtenstein, and St. Gall, S. by Grisons, E. by Tyrol. The Arlberg range is in the E. Cattle and

goats are reared. Cap., Bregenz. Pop. 130,000.

Voronezh, a former prov. and its cap. in S. Russia. The prov., which had an area of 25,443 sq. m., is watered by the Don, has uplands in the W. and E. of the Don, as well as low, level, and sometimes sandy stretches. There is no great extent of forests, and the soil in general is fertile. Besides all kinds of cereals, sunflower, tobacco, aniseed, and beetroot are grown and exported, and there are rich pastures adapted for horse and cattle breeding. Pop. 3,687,000. V. is now included in the new Central Black Soil Area. The tn. lies on the Voronezh. It is an attractive city; and depends for its flourishing commerce on the Don, which brings down wood, tallow, hides, and flax, besides cereals. Pop. 94,800.

Voronoff, Serge, Russian surgeon; b. July 10, 1866. Educated Paris, where, before Great War, he was chief surgeon in the Russian Hospital. In 1917 he became chief surgeon in the Military Hospital. Afterwards, director of biological laboratory at École des Hautes Études. Later appointment, director of experimental surgery of Station Physiologique, Collège de France. Has become somewhat celebrated for his essays toward restoration of aged persons to youthful vigour by transference of glands from lower animals. *See* GLAND, also DUCTLESS GLANDS.

Vörösmartz, Michael, *see* HUNGARY — *Literature*.

Vortex, a term used in hydrodynamics for a motion in a fluid in which the individual particles are conceived as having a circular or rotatory motion. In hydrodynamics a distinction is drawn between such a motion and one in which there is no rotation of the individual particles, a distinction first pointed out by Stokes. Lagrange then stated his great fundamental theorem of these two types of motion in a non-viscous or perfect fluid. He stated that irrotational motion always remains as irrotational motion, and rotational or vortex motion always remains as vortex motion. Thus it is impossible to start or destroy vortex motion in such a liquid. Vortex motion is represented by a straight line vector perpendicular to the plane of rotation, and of length proportional to the vorticity. It can be shown that such a line or filament cannot start or end in the interior of the fluid, and that a vortex always consists of the same elements of liquid. Kelvin adopted this idea in his vortex theory of matter, conceiving matter as vortices motion in the all-pervading ether.

Vortigern, a British chief who after

the departure of the Rom. troops became head of the British tribes (c. A.D. 425). Harassed by the Picts and Scots, he called in the Saxons to his aid, and so led to his country's conquest by them.

Vosges, a frontier dept. (2303 sq. m. in area) in eastern France, shut in eastward by the V. Mts., the highest Fr. peak being Hohneck (4482 ft.). The Moselle and Meuse have the largest drainage areas. Oats, wheat, and the vine are cultivated; and cheese-making and cattle-grazing are important. Large forest tracts account for the wood-working industries, but textile goods are the first manuf. Epinal (also the chief tn.) and St. Dié are two of the five arrondissements. Pop. (1926) 382,000.

Vosges Mountains (Lat. *Vogesus*), are a range of mountains along the W. bank of the Rhine, closely resembling in many respects the Black Forest along the E. They stretch for 150 m. from Basel to Mainz, through Lorraine and Alsace. The Ballon de Guebwiller is the culminating point (4680 ft.).

Voss, Johann Heinrich (1751-1826), a Ger. poet, translator, and philologist. His works include *Idylls*, 1802; *Luise*, 1795 (which suggested Goethe's *Hermann und Dorothea*); and excellent translations of the classics, including Homer's *Odyssey*, 1781, and *Iliad*, 1793, Virgil, 1799, Horace, 1806, Theocritus, 1808, Aristophanes, 1821, and Shakespeare. His *Sämliche Werke* were pub. in 1853.

Voss, Richard (1851-1918), a Ger. author and playwright; b. Sept. 2, at Neugrape, Pomerania. Educated: Jena; Munich. Librarian at Wartburg from 1884. Extremely voluminous. Among his plays are: *Alexandra*, 1886; *Eva*, 1889; *Schuldig*, 1890; *Die Patrizierin* (Schiller prize), 1896. Novels include: *Die Sabinerin*, 1889; *Der Neue Gott*, 1897; *Römisches Fieber*, 1902; *Die Leute von Valdaré*, 1903; *Narcissusaufer*, 1909; *Zwei Menschen*, 1911; *Brutus, auch Du!* 1917. Died at Königsee, June 10.

Vossius, or Voss, Gerhard Johann (Gerard Jan) (1577-1649), a Dutch scholar, rector of Dordrecht high school (1600), and of the theological school at Leyden (1614), becoming professor of eloquence there (c. 1622). He visited England (1629), and became a prebendary of Canterbury through Laud's influence. On his return to Holland he was made professor of history in Amsterdam University (1631). His works include: *Aristarchus, sive de Arte Dramatica*; *Historia Pelasgiana*, 1618; and *Ars Rhetorica*, 1623. They were published 1695-1701. See Tollins, *Oratio* . . ., 1649; V. André, *Bibl. Belgica*;

Toll, *De Fossio perfecto grammatico*, 1778.

Votyak Autonomous Area, an autonomous prov. of E. Central Russia, included in the Nijni-Novgorod Area. The Ural Area adjoins it on the E., the Tatar Aut. S.S.R. on the S. It is watered by the R. Ish, on which stands its cap. Ighevsk, where there are ironworks. Railways from Vyatka to Perm and Kajan to Sverdlovsk (Ekaterinburg) pass through the N. and S. of the Area. The climate is severe, but the soil fertile. It is inhabited mainly by the Votyaks, a tribe of Finnish origin, who number about half a million.

Vouet, Simon (1590-1649), a Fr. historical painter. He was considered founder of the Fr. school of painting, proving a successful rival of Poussin, who visited France (1640). V. accompanied the Fr. ambassador to Constantinople (1611), and went to Italy (1612), studying the works of Paul Veronese at Venice and of Caravaggio and Guido at Rome. Louis XIII. recalled him to France (1627) as his principal painter, and gave him work in the Luxembourg, Louvre, and St. Germain palaces. Richelieu also employed him at the Château de Rueil. Le Sueur, Le Brun, Mignard, and Dufresnoy were among his pupils.

Vowels, see ALPHABET, PHONETICS.

Voysey, Charles (1828-1912), a founder of the Theistic Church, b. in London, and took holy orders in the Church of England. He occupied a number of curacies, and his views became increasingly unorthodox. In 1863 he was compelled to leave St. Mark's, Whitechapel, because he denied the reality of eternal punishment. He passed to Woolwich and then to Healaugh in Yorkshire. On account of his teaching here he was summarily deprived of his living and founded the church of which he remained the head until his death. Among his works are: *The Sling and the Stone*, 1872-93; *Theism, or the Religion of Common Sense*, 1894; *Religion for all Mankind*, 1903.

Vratsa (Vratza), the cap. of Vratsa dept., Bulgaria, on the N. slope of the W. Balkans, 40 m. from Sofia. It produces wine, silk, gold and silver filigree, jewellery, and leather. Pop. about 13,900 (dist. 392,800.).

Vryburg, the cap. of Vryburg dist., British Bechuanaland (E.), S. Africa, 124 m. from Kimberley. Founded 1882, it is a Wesleyan Missionary Society station, and capital of Bechuanaland, which was annexed to the Cape of Good Hope (1895). Pop. about 5100.

Vryheid (Dutch, 'freedom'), a tn. of N. Natal, S.E. Africa, 133 m. from Pietermaritzburg. It is the cap. of

Vryheid dist., rich in coal (at Hlobane), copper, gold, and other minerals. Once part of Zululand, it was ceded to the Boers under Meyer, proclaimed an independent 'New Republic' (1884), incorporated with the Transvaal (1888), and annexed to Natal (1903). Pop. about 2300.

Vulcan. In 1859 Leverrier suggested that perturbations of Mercury's orbit unaccounted for were caused by an unknown planet revolving nearer the sun. Meeting with some confirmation, Leverrier calculated the elements; a transit expected in 1860 did not confirm his calculations. Two American observers, Watson and Swift, during the total eclipse of July 29, 1878, claimed to have found it, but no discovery has resulted from any observations, and the existence of V. is discredited.

Vulcan, the Rom. god of fire, identified with the Gk. god Hephaestus (q.v.).

Vulcanisation, see RUBBER.

Vulcano, see LIPARI ISLANDS.

Vulture, a bird with a strong hooked beak, and repulsive in appearance and habits, but of considerable value on account of its food being mainly composed of carrion, which it discovers by its abnormally keen senses of sight and smell. Vs. cannot, like eagles, carry food with their feet and claws, but feed their young by regurgitating from the crop as pigeons do. They are classified in two families, the Vulturidae and the

Cathartidae. The former include the griffon V. (*Gyps fulvus*) which occasionally reaches Britain, the black V. (*Vulture monachus*), and the Egyptian V. (*Neophron peronopterus*). Among the Cathartidae are some birds of great size and powerful flight; examples are the condor (*Sarcorhamphus gryphus*), the black V. (*Catharista atratus*), and the Turkey buzzards (*Rhinogryphus*).

Vyatka, a former prov. and its cap. in N.E. Russia. The prov., which is now included in the Nijni-Novgorod Area, had an area of 59,329 sq. m., and is an undulating plateau some 1000 ft. above the sea. The Kama runs in and out of this prov.; but it is chiefly drained by the Vyatka and its tributaries, including the Votka and Izh, near which iron ore is found. The high-road to Siberia crosses V.; there it is but one railway, namely, that from Archangel to Perm. It is above all a corn-growing country, but pony and cattle breeding and wood cutting are thriving industries. Over half the surface is forest, and the peasants own 44 per cent. Factories are increasing in number. Pop. 4,062,000. The tn. of V. lies on the Vyatka. It was a cathedral city. Candles and silver and copper wares are manufactured; commerce is largely in wax, animal products, paper, and corn. Pop. 60,100.

Vyshnii-Volochok, see VISHNI-VOLOTCHOK.

W

W, the twenty-third letter of the Eng. alphabet, sometimes called a 'consonantal *u*,' capable of performing the functions both of consonant (as in *work*, *wit*) and vowel (as in *law*, *few*, and Welsh names like *Bettws-y-Coed* and *Braich-y-pwll*). Probably the Latin *v* or *u* (as consonants) and the Gk. digamma *F* resembled our modern *w*. It represents a double *V* (or *U*), *W*. The Anglo-Saxon alphabet (from ninth century) had a distinct character, *ƿ*, the present mode of writing *W* dating from the thirteenth century. The Fr. use *ou* as a substitute, or *Gu* for proper names (Guillaume for William). The Spanish use mostly *hu* (Huanuco, Huelva), but sometimes *gu* (Guatemala, Guadiana). See Willis in *Cambr. Phil. Trans.*, iii. 231; Key's *Alphabet*. In chemistry, *W* is the symbol for one atom of tungsten (wolfram).

Wabash: (1) The co. seat of Wabash co., Indiana, U.S.A., about 42 m. S.W. of Fort Wayne, on the Wabash R. It has manufs. of motor trucks, phonograph cabinets, office supplies, asbestos, tractors, heating plants, canned goods. It has also iron works and railroad shops, and manufs. paper. *W.* lies in an agricultural dist. Pop. (1930) 8840. (2) A trib. of the Ohio R. rising in Ohio, and flowing through Indiana, eventually forming the boundary between Indiana and Illinois. It is navigable as far as Covington, and is connected with Lake Erie by the Wabash and Erie Canal. Length about 550 m.

Wace, Robert, an Anglo-Norman poet of the twelfth century. He was the author of a number of lives of saints, but his two most important works are his historical poems, the *Roman de Brut* and the *Roman de Rou*. *W.* called the former the *Geste des Bretons* ('History of the Britons'), but it is now always known as the *Roman de Brut*. It is a reproduction in verse in the Fr. octosyllabic couplet of Geoffrey's *Historia*. The *Roman de Rou* is a chronicle history of the Dukes of Normandy. *W.* commenced

it in 1160 at the request of Henry II., but Henry afterwards appointed another poet to write it, and so *W.* left his work incomplete.

'*Wacht am Rhein*' ('Watch on the Rhine'), a Ger. patriotic song, written when France threatened the l. b. of the Rhine (1840). The words were by Max Schneckenburger (1819-49), and in 1854 were set to music by Carl Wilhelm (1815-75).

Waco (so called from the Waco or Hueco Indians), the cap. of McLennan co., Texas, U.S.A., and lies on the Brazos, 186 m. by rail N.W. of Houston. It is a university city, and has factory products, chiefly from cotton seed. Pop. 52,848.

Wadai, a state of 170,000 sq. m. in area in the Central Sudan, which accepted the Fr. Protectorate in the summer of 1903, and since 1909 has formed part of Fr. Equatorial Africa, once the Fr. Congo. In 1911 a Fr. force occupied Arada, a tn. north of the cap. of *W.*, and in 1913 Ain-Galahka. *W.* is part of the Chad Territory, which on Mar. 17, 1920, was created a separate colony by decree. The whole territory of Chad is governed by a lieutenant-governor under a governor-general of Fr. Equatorial Africa, residing at Brazzaville in the Middle Congo, and administrative council. *W.* forms the N.E. part of Chad Territory, is bounded on the N.E. by Darfur, and on the N. is the Sahara Desert. The climate is hot and dry, the rivs. existing only in rainy weather. The cap. is Abeshir, which is the head of caravan routes connecting it to Benghazi, on the coast of Tripoli, and Nigeria. The roads of *W.* are bad, being merely improved paths, and there are no railways. The nearest riv. port is Fort Lamy, cap. of Chad Territory on the Chau R., W. of Wadal, and the nearest wireless station at Mao in Kenem. The chief minerals are copper, zinc, and lead. Cattle, camels, and ostriches are reared, but difficult transport prevents their being exported. Ostrich

feathers, aigrettes, and ivory are exported from Abeshr. Pop., chiefly Mabas (negroes) and Arabs, about 1,000,000. See G. Bruel, *L'Afrique Equatoriale française*, 1930.

Waddington, William Henry (1826-94), a Fr. statesman, b. of Eng. parents at St. Rémy-sur-l'Avre in France. He naturalised himself as a Fr. subject in 1849. He was a member of the National Assembly in 1873, and in 1877 he held a position in the cabinet as Minister of Foreign Affairs. For ten years he was the Fr. ambassador in London (1883-93).

Wadham College, Oxford, was founded in 1612 by Nicholas Wadham of Merifield, in Somersetshire, for a warden, fifteen fellows, fifteen scholars, two chaplains, and two clerks. It was built upon the site of an auct. house of the Augustinian Friars, and from this college the Royal Society had its origin, and held its sittings from 1652-59 in the great room over the gateway.

Wadhwan, a fortified tn., manufacturing soap, saddlery, and cotton, 60 m. W.S.W. of Ahmadabad, in Kathiawar, Bombay, India. Pop. 27,800.

Wadi, or Wady, an Arabic word signifying a riv., a riv.-course, a ravine, or valley. It is supposed that the Gk. *oasis* is a corruption of W.; it is also of frequent occurrence in the names of places, e.g., Wadi Musa, in Arabia. In Spain, where most of the rivs. bear names given by the Arabs, *wad* has been transformed into *guad*, e.g. Wadi-l-abyadh has become Guadalaviar.

Wady Halfa, includes a British camp (founded in 1884), a civil cantonment, and a native village on the Nile, just within the northern frontier of the Anglo-Egyptian Sudan. Pop. of cantonment about 3800.

Wafel (Dutch *waefel*, a cake of wax), a thin cake of flour paste, or more generally, any thin cake or disc. The Ws. used in the Eucharist service of the Rom. Catholic Church are thin discs of unleavened bread, stamped with a sacred symbol. Coloured discs of gummed paper are used to designate seals, and are called wafers as being substitutes for the thin cakes of sealing wax.

Wager of Battle, see TRIAL BY COMBAT.

Wager of Law, the name by which the mode of proof by compurgation continued to be employed occasionally in actions for debt until finally abolished in 1833. Compurgation was the alternative to trial by ordeal. It involved bringing a certain number of witnesses called *compurgators* to swear to the good character and credibility of the accused, and the number

of compurgators deemed essential to establish any state of facts depended on the social position of such witnesses; the oath of a thane, for instance, had the weight of that of six ceorls; but the oath of a priest required no compurgation at all.

Wages, the price of labour, or that part of wealth which is given in exchange for labour. The ultimate source of W. as of profits (*q.v.*) is the value of that which capital and labour jointly produce, but in practice W. are paid in the first instance out of capital, which in itself is one of the agents of production (see WEALTH). That part of wealth which is expended in W. is commonly called by economists the wages-fund, an expression which is now generally understood to mean no more than that in every industry the wages-capital must be in a certain ratio to the rest of the capital; but, as formulated by Mill, the wages-fund theory regarded general W. as being determined by the 'ratio of capital to pop.'; a theory which has been the subject of much controversy. Prof. Sidgwick rejects the theory mainly on the ground that it leaves out of account the efficiency of labour, though he admits that Mill himself was careful to point out that the wages-fund was made up mainly of circulating capital, and that, as a theory, it was inadequate to determine the rate of W. It is clear, as indicated above, that W. cannot be regarded as ultimately paid out of capital; and that the remuneration of labour is really the share of produce that remains after paying for the use of capital and land. Competition as between the employers themselves tends to raise W., as between labourers, to lower them. In this respect, however, it is necessary to take into account the modification of the extreme results of unchecked competition effected by (1) trade unions (see TRADE UNIONS), and (2) Minimum Wage Acts. Under the Coal Mines (Minimum Wage) Act, 1912, dist. boards were set up to settle the rate of W. in different coal areas, and the effect generally of such Acts as this, and of the Minimum Wage Regulations under the Trade Boards Act, 1909 and 1913, was that many workmen or labourers obtained increased rates. The outbreak of the Great War led to the postponement of further legislation to regularise W., and it was not until 1918 that the Trade Boards (*q.v.*) Acts of 1909 and 1913 were extended to other trades, securing a minimum W. to many millions of workers who up till then had been outside the scope of the protection afforded by the Acts

But the fixing of a mere minimum W. in depressed trades offered no solution to the W. problem as affected by the high cost of living after 1918, and in that year the Wages (Temporary Regulation) Act became law. It had the effect of fixing as minima W. in force at the time of its passing with the provision for adjustment by an Interim Court of Arbitration. The Act was passed for six months only, but it was renewed in 1919, and by the Industrial Courts Act of the same year certain of its provisions were still further extended. Since then state legislation has provided a permanent safeguard against the exploiting of workers in the trades concerned by the further extension of the facilities of the Trade Boards Acts. In 1922 a gov. committee was appointed under the presidency of Viscount Cave to inquire into the working and effects of the Trade Boards Acts. The report was issued in the same year and is a valuable contribution to the literature of labour questions. As among different employments the causes that produce different rates of W. are stated by Adam Smith to be (1) the agreeableness or otherwise of the nature of the employment; (2) the difficulty or otherwise, and the expense or cheapness involved in apprenticeship; (3) the constancy of employment; (4) the degree of trust necessarily reposed in the workman, and (5) the chances of success in the given trade. There are various methods of fixing W., the variety being due to a corresponding variety in the demands and character of the employment. Broadly speaking the workers' output will be larger the more nearly the method of payment is adjusted to individual results. In this connection a system of piece W. is a common form of remuneration. Under this plan workmen, especially where machinery is used, are paid exactly in proportion to their physical output. Thus the better a man works the more certain he is of regular employment and the greater will be his earning capacity. The system has been for some time practised in coal-mining, textile industries, and boot and shoe trades, where conditions make such a system satisfactory, but in such industries as engineering, woodworking, and building a time W. system has been found to be more effective, since the different kinds of machinery and material, besides varying quality of work, make a flat rate of piece W. impossible to fix. Such time W. are usually paid by the hour. Another method of wage-fixing is known as task W., and is being adopted where practicable under modern, scientific factory economy.

Experiments are made to determine what output a first-class workman can produce in a given time. The output thus defined is called a standard task and the W. system is adjusted to encourage the worker to maintain the level of efficiency set by it. The plan is in operation in many of the mass-production works of the U.S.A. The success of the plan depends upon the scrupulousness of the employer, since there is a danger of exploitation, and the strong position of trade unionism in this country appears at present to make it improbable that the system will be widely adopted. (On the influence of protection on wages, see under PROTECTION and TARIFF; and on the connection between W. and prices, see under PRICE.) In 1908-09 W. were depressed, but thereafter began to rise, the most marked increase being in 1912; which upward tendency was steadily maintained until the outbreak of the Great War. The increased cost of living caused by the War resulted in a rapid rise in W., though they did not keep pace with the cost of living, and wage-rates rose to their peak during the industrial boom of 1920, when a reaction took place. Since 1924 money wage-rates, according to the Ministry of Labour statistics, have remained practically unchanged at 170 to 175 per cent. of the pre-War level, and Professor Bowley's index of earnings shows a fall of about 1 per cent. from 1924 to 1930. The following table illustrates the comparative value of real W., apart from purchasing power, in certain large tns. of various countries, and is taken from the Statistical Tables Relating to British and Foreign Industry, 1931.

Country	Index relating to Great Britain (100)
Great Britain	100
Canada	165
Australia	148
Irish Free State	97
Germany	77
France	58
Austria	52
Italy	43
Netherlands	87
U.S.A.	197

During the 1931 world-wide financial crisis wage-rates fell considerably and the continuance of the trade depression into 1932 has resulted in a further reduction. The official figures are not yet available, but it is estimated that a fall of about 7 per cent. has so far taken place. Consult Henry Clay, *Problem of Industrial Relations*, 1929; Pigou, *Economics of*

Welfare, 1929; de Montgomery, *British and Continental Labour Policy*, 1922; *Statistical Abstract of British Empire*, 1931; *Report of Committee on Finance and Industry*, 1931.

Wagga-Wagga, a tn., on the Murrumbidgee, in Wynyard co., New South Wales, Australia; the centre of a sheep farming and gold-mining dist. Also the seat of a Rom. Catholic bishopric. Pop. 7400.

Wagner, Rudolf (1805-64), a Ger. physiologist, b. at Bayreuth. After studying at Paris under Cuvier, he became ultimately professor of zoology at Erlangen (1832-40), whence he moved to Göttingen. His publications include *Handwörterbuch der Physiologie* (1842-53) and *Neurologische Untersuchungen* (1853-54).

Wagner, Wilhelm Richard (1813-83), Ger. dramatic composer, b. at Leipzig. The hearing of one of Beethoven's symphonies fired him with the ambition to become

had gone in search of employment. From Königsberg he went to Riga where he was made musical director at the new theatre. In 1839 he went to Paris with his unfinished opera *Rienzi*, a work which scarcely fore-shadows that breaking-away from established traditions which was the most notable feature of his later productions, but which was nevertheless a remarkable achievement for a young man of twenty-six. It was produced with great success at Dresden in 1842, and was followed by *Der fliegende Holländer* (The Flying Dutchman), which did not meet with the same approval. Two years later, in 1845, *Tannhäuser* proved a failure, only Schumann recognising its merits. In 1843 he finished *Lohengrin*, which touches the summit of 'Wagnerian' music; but in the following year, W., who had mixed himself in the political agitation of the time, was forced to quit Saxony. He escaped to Zürich, where he remained till 1859. *Der Ring des Nibelungen*, his great tetralogy, was begun before he left Dresden, but ere he completed it he turned aside to write *Tristan und Isolde*. In 1861 he received a pardon and returned to Germany. *Tristan* was produced in 1865, and *Die Meistersinger*, a comic opera, in 1868. His first wife having d. in 1865, W. married Cosima, daughter of Liszt, in 1870. His ideas were adopted by Ludwig, King of Bavaria, who invited him to Munich to complete the *Ring*, and advanced his schemes in every possible way. Six years later the entire *Ring* was performed at Bayreuth, in a building specially erected for the purpose. His last work, *Parsifal*, was a drama founded on the story of the Holy Grail. W. died of heart-failure, and was buried in the garden of Wahnfried, his house in Bayreuth. *Consult*: In Ger. *Schriften u. Dichtungen*, in 10 vols., 1871-83; his autobiography, *Mein Leben*, 1911 (Eng. trans. *My Life*, 1911); his *Letters* (to Uhlig, Fischer, and Heine), 1888; *Correspondence with Liszt*, 1900; with Hans v. Bülow, 1916; *Family Letters*, 1907; *Bayreuth Letters*, 1917. See W. Altmann, *R. W.'s Letters in Chronological Order and Classified*, 1905. Eng. trans. 1927. Biographies: C. F. Glasenapp (6 vols., Leipzig), 1911; H. S. Chamberlain, *R. Wagner*, 1894. Monographs: Guido Adler, *R. W.*, 1904 and 1922; P. Moos, *R. W. in his Time and After* (*R. W. in seiner Zeit und nach seiner Zeit*), 1913; Friedrich Nietzsche, *R. W. in Bayreuth*; 1876; and other writings on W. For bibliography consult also N. Oesterlein, *Catalogue of a Wagner Library*, 4 vols., 1882-95. In Eng.: F.



W. R. WAGNER

a great composer, and he placed himself under Theodor Weinlig, cantor at the Thomaschule, with whom he studied composition. Mozart and Beethoven were his idols in those days. His first symphony was produced in 1833 at Leipzig, and in the following year he became conductor of the opera at Magdeburg. By that time he had already composed two operas, *Die Feen* (the Fairies) and *Das Liebesverbot* (Love's Interdict). In 1836 he married Wilhelmina Planer, an actress at Königsberg, whither he

Hueffer, *R. W. and the Music of the Future*, 1874; K. E. Krehbiel, *Studies in the Wagnerian Drama*, 1891; F. Praeger, *W. as I knew him*, 1891; H. T. Finck, *W. and his Works* (2 vols. New York), 1893; G. B. Shaw, *The Perfect Wagnerite*, 1898; E. Newman, *A Study of W.*, 1899; W. Ashton Ellis, *Life of R. W.*, 1902-08; W. J. Henderson, *R. W.: his Life and Dramas*, rev. ed., 1923; E. Newman, *Wagner, as Man and Artist*, 1926; W. Lippert, *Wagner in Exile*, Eng. trans. 1930; P. Bekker, *Wagner*, Eng. trans., 1931. Trans. into Eng.: *R. W.'s Letters on Liszt's Symph. Poems* (trans. by Hueffer, 1881); *The Music of the Future* (trans. by E. Dannreuther, 1873); *R. W. on Beethoven* (id. 1880); *On Conducting* (id. 1885); H. S. Chamberlain's *R. W.* (1900); *Opera and Drama* (trans. by E. Evans, sen., 1910).

Wagram, a vil. near Vienna, Austria. Historically it is important as being the site of the Battle of Wagram (July 1809), in which Napoleon defeated the Austrians under the Archduke Charles.

Wahabis, a Mohammedan sect which takes its name from its founder, Mohammed ibn Abdul-Wahab (1691-1787). The movement which he started was essentially a reforming one and aimed at re-establishing the Koran as the sole rule of faith. While disowning tradition, he also endeavoured to abolish popular religious ceremonies and the excessive veneration of the Prophet and the saints. He insisted on the most rigorous observance of the ceremonial law. The influence of the movement is widespread through Arabia, Africa, India, and the Mohammedan East generally, and it has led to many fanatical revolts.

Wahsatch Mountains, a long range running N. and S. through the centre of Utah, U.S.A. They form the eastern margin of the Great Basin and contain at least four peaks over 11,000 ft. high. The loftiest is Timpanogos Peak (11,957 ft.).

Waifs, goods found, the ownership of which is unknown. Originally applied exclusively to goods abandoned by a thief to avoid arrest. Such goods were forfeited to the king or lord of the manor having the franchise (q.v.) of the W.

Waikato, the chief riv. (200 m. long) of North Island, New Zealand. Rising to the S. of Lake Taupo, which it drains, it flows N.N.W. and finally W. to Port Waikato on the W. coast, where it enters the Pacific.

Wailing (or Western) Wall, The, consists of part of the circumvallation of the Temple Court, and an integral part of the Haramesh area, Jeru-

salem. Disputes between Jews and Moslems over their respective rights of access to, and of possession of, this very ant. site were the immediate cause of a sanguinary outbreak in Aug. 1929, which greatly embittered the relations between the two communities and aggravated the difficulties of the British mandatory authority. (See JERUSALEM; PALESTINE.) The great stones forming the lower rows of this wall probably go back to the time of Solomon, and if the adjoining 'Solomon's Stables' be genuine (as seems undoubted), then this building, too, dates from that time. It is named by the Jews the 'Kotel Maarabi' or 'Western Wall,' and only by Gentile onlookers has it been associated with 'wailing,' and that because the Jew recites there, along with other items of ritual, the Book of Lamentations in a loud voice. After the destruction of the Temple in A.D. 70 by the Roms., when it became difficult to determine exactly the site of the Holy of Holies, we are told that divine sanction was found for the chosen site in the Song of Solomon ('Behold, he standeth behind our wall'). This biblical interpretation is repeated again and again down through the ages. In medieval times the whole life and literature of the Jewish world were coloured by associations of the W. W. Many allusions might be found to it in both the Babylonian and Spanish-Jewish literature. Throughout the Middle Ages the W. W. was used as a centre of prayer, but could be used, and was used, for other kindred purposes, as e.g. in 1856, when the Reformed Jews made their first efforts in the East by opening a school in Jerusalem, and the Orthodox party gathered at the W. W. for prayer and protest. The attitude of the Turks after Jerusalem had fallen to them was generally kindly and tolerant to the Jews, and it is said that Selim I granted a charter or firman to the Jews (an assertion which is not confirmed by any extant evidence). The Jews, indeed, assert that the W. W. or Wailing Place is the most ant. and most sacred devotional shrine of the Jew, and that he possessed and worshipped at it centuries before Islam came into existence, thus giving him a prescriptive right of nineteen centuries' duration. The Moslems of to-day, however, bitterly contest this claim, and assert that the wall and its adjoining pavement are an integral part of the shrine which ranks next to Mecca and Medina in sanctity. After the subsidence of the outbreak of 1929, a League of Nations Commission was appointed to determine the respective rights of Jew and

Arab anent the W.W. This commission found that the Moslems have the sole ownership of and sole proprietary rights to the W. W. and the adjoining pavement; and while granting the Jews free access thereto for purposes of devotion, it limits their right to carry the Ark containing the Scroll of the Law near the Wall to certain special occasions.

Wainwright, Thomas Griffiths (1794-1852), an Eng. journalist, artist and poisoner, b. at Chiswick. He was brought up by his grandfather, Dr. Ralph Griffiths (1720-1803), founder of the *Monthly Review*. Entering on a journalistic career, he contributed to *Blackwood's* and the *London Magazine*, under the pseudonym of Janus Weathercock, etc., and became a friend of Charles Lamb. He also exhibited in the Royal Academy (1821-25) and wrote art-criticisms. To procure money to pay debts, he poisoned his sister-in-law, mother-in-law, uncle, and a friend, and in 1837 was arrested on a charge of forgery and transported for life.

Waits were originally night watchmen who carried musical instruments. The term, however, came to be applied to musicians who had no watch duties, and now signifies the bands of street musicians who play at Christmas time. They date from early times; in England from 1400.

Wake (Old Eng. *wacu*, a watch); or **Lyth-wake** (Old Eng. *lyc*, a body), an anct. observance by which the body of a dead person was watched all night by friends and relatives. Ws. were also observed on the eves of saints' days. These vigils were the cause of revelry and disorder, and now survive only in Ireland.

Wakefield: (1) A parl. bor. in the W. Riding of Yorkshire; has been the seat of a bishop since 1888, when All Saints was made the cathedral. Many stirring events in Eng. history have occurred here, for instance, the Battle of Wakefield in 1460. (See *ROSES*, *WARS OF THE*.) W. is well situated on a gentle slope rising from the R. Calder. Pop. (1931) 59,100. (2) A township of Middlesex co., Massachusetts, U.S.A., including several manufacturing villages. It was originally part of Reading. Pop. (1930) 16,313.

Wakefield, Edward Gibbon (1796-1862), was the father of regulated emigration to the colonies, and when in Newgate Gaol, serving a term for abduction of his second wife, the marriage being afterwards dissolved, he wrote *The Letter from Sydney* (1829), exposing the evil effects of 'transportation' and roughly sketched a system of colonisation. He formed a colonisation society in

1830, and the Bill to Erect S. Australia into a British Prov. followed as a result. The scheme failed, but in 1837 he turned his attention to the acquisition of New Zealand as a British colony, first in face of much gov. opposition, but with its support when there was a threat of Fr. occupation. W. d. in the colony. See A. J. Harrop, *The Amazing Career of Edward Gibbon Wakefield*, 1929. *The Letter from Sydney*, together with other of W.'s writings, has been reprinted in the Everyman's Library. **Wakefield Mystery**, see *TOWNLEY PLAYS*.

Wake-robin, another name for cuckoo-pint. See *ARUM*.

Wakley, Thomas, see *LANCET*.

Walafrid Strabo (c. 807-849), Ger. monk and scholar. Educated: Reichenau. Entered Benedictine order at fifteen. Preceptor of Prince Charles (the Bald), 829. Abbot of Reichenau from 838. On death of Louis the Pious, took the side of Lothair; driven from the abbey, but returned 842. Wrote *Visio Wettini* (a poem that foreshadowed Dante's work); *Hortulus* (poem describing his garden); *Glossa Ordinaria* (a popular Scripture commentary); also some Lives of Saints, prose and verse.

Walcheren, an is. in the prov. of Zeeland, Holland, situated between the E. and W. Scheldt. The chief tns. are Middelburg and Flushing.

Walcheren Expedition, The (1809), an attempt made by Britain during the Napoleonic War to seize Antwerp and the Scheldt. Chatham commanded the land forces and Sir R. Strachan the naval forces. The only achievement was the landing of the soldiers on the island of Walcheren, where thousands died of fever.

Walcott, Charles Doolittle (1850-1927), American palæontologist; b. March 31, at New York Mills, N. Y. Assistant to state geologist, 1876; entered, 1879, U.S. Geological Survey—of which he was director, 1894-1907. Palæontologist in charge of invertebrates section, 1888-93; in charge of geology and palæontology, 1893-94. Director, National Museum, 1897-98. Secretary, Carnegie Institution, 1902-05. Secretary, Smithsonian Institution, from 1907. President Geological Society of America, 1901. Director U.S. reclamation service, 1905-07.

Waldeck, or **Waldeck-Pyrmont**, a former principality of Germany consisting of W. enclosed by the Prussian provs. of Westphalia and Hesse-Nassau, and Pyrmont surrounded by Hanover, Lippe-Detmold, and Brunswick. In 1919 W. became a State of the Ger. Republic with a separate constitution. In 1929, however, W. was

merged into Prussia of which it is now a prov. The chief tn. is Arolsen, while the tn. of Pyrmont is noted for its mineral springs. Area 433 sq. m. Pop. 61,723.

Waldeck-Rousseau, Pierre Marie René (1846-1904), a Fr. lawyer and politician, *b.* at Nantes, son of René W.-R., also a great lawyer and politician. Generally regarded in his day as the 'strongest personality in Fr. politics since the death of Gambetta.' After completing his studies he commenced practice at the provincial Bar at St. Nazaire and Rennes. Became mayor of Nantes (1870). In 1879 entered politics as a deputy for Rennes, retaining his membership for that division for nearly ten years. He attached himself to the Republican party and throughout his career fought strenuously against the reactionary tendencies of the Nationalists. In 1881 he became Minister of the Interior in the remarkable 'Grand Ministère' of Gambetta, and on the death of the latter he retained that office under Jules Ferry. In 1886 he attached himself to the Paris Bar. Though still deputy for Rennes, he did not take an active part in politics again until 1887, when he became senator for the department of the Loire. In the Boulanger controversy he displayed his wonted vigour, but earned the animosity of the plebiscitary party. But it was essentially the Dreyfus affair that brought W.-R. into such prominence. He was called upon in 1899 by President Loubet to form a cabinet, and in this, in spite of his obvious reluctance, he eventually succeeded, ranging in his cabinet many notabilities of diverse opinions whose one bond of union was the policy of resistance to the Nationalist reaction and the dispersal of the religious orders.

Waldemar I. (1131-82), King of Denmark, surnamed the Great. Was the posthumous son of Canute Lavard. His childhood and youth were periods of great danger to him, and after becoming a candidate for the Danish throne he narrowly escaped assassination. He became king in 1157, and with Absalon (*q.v.*) ruled the country firmly and well.

Waldemar II. (1170-1241), King of Denmark, succeeded his brother, Canute VI., in 1202. He had already shown himself a determined upholder of Danish independence. He obtained possession of Lübeck and two other equally important bishoprics, and by treaty and friendship with Frederick II., the emperor, he obtained all the Wend lands and the lands of N. Germany. He also directed his attention towards Es-

thonia, Livonia, and Prussia, and tried, not altogether unsuccessfully, to bring them under his influence.

Waldemar IV. (1320-75), King of Denmark, *b.* at a period when the fortunes of Denmark were at their lowest ebb. W. was elected king at the age of 20. His aim was to obtain possession of those territories which formerly belonged to the Danish crown and which were now scattered. By 1360 practically all the old Danish lands, including Scania, were in his hands.

Walden, Paul, a Russian chemist, *b.* in 1863, professor of chemistry at Riga and later at Rostock. His work has been mainly concerned with the electrical properties of solutions. See WALDEN INVERSION.

Waldenburg, a tn. in Silesia, Prussia, 43 m. S.W. of Breslau. The chief manufs. are porcelain, firebricks, and stoneware. Pop. 15,300.

Walden Inversion, discovered in 1895 by P. Walden (*q.v.*), refers to the change in sign of optical activity occasionally observed when an optically active compound is converted into a derivative; such an inversion is uncommon, and the study of cases where it exists has thrown light upon molecular architecture. Example: *Lævochlorosuccinic* acid on treatment with aqueous potassium hydroxide yields *dætromalic* acid; not, as would be expected, *lævomalic* acid. See STEREOCHEMISTRY.

Waldenses, or **Vaudais**, a religious body initiated about 1176 by a rich merchant of Lyons, Peter Waldes. At first a movement for voluntary poverty, gradually it developed unorthodox doctrines, some borrowed from the Cathari. Spreading through Provence, Lombardy and N. Spain, the W. were subjected to intermittent persecution for centuries. A remnant lives on in three high valleys of Piedmont, though some small congregations exist elsewhere in big Italian cities and in N. and S. America. These are assisted by Protestants, with whom, however, the W. refuse to amalgamate.

Wales, see ENGLAND AND WALES.

History.—The aboriginal inhabitants of Britain belonged to an obscure non-Aryan race; but these were in the sixth or seventh century B.C. conquered and assimilated by the Goidelic Celts, the direct ancestors of the modern Welsh. The Celts attained a considerable degree of civilisation under Rom. rule, and accepted Christianity in about A.D. 200, and they maintained this faith when the rest of the island was re-paganised. On the conquest of Britain by the Saxons (c. 450-600) the Celts were driven back into the western corners

of the island—Cumberland, W., and Cornwall. Henceforth W. became the main stronghold of the Celts or Britons. Powerful native princes arose in W., and extended and consolidated their dominions. Among the most notable of these were Cadwallon the Long-Handed and his son Maelgwn Gwynedd. The Welsh people were for a time united under the latter's grandson, also named Cadwallon. About this period monasticism made great progress in Wales, and the country began to be organised on tribal lines. The Britons of W. made for some centuries repeated attempts to recover the N. parts of England from the Saxons; but these attempts ceased after 664, and there follows a period of internal strife and Saxon aggression, W. being again divided among a number of petty princes. The country was once again united under Rhodri the Great (844-77), who successfully resisted the onslaughts of the Danes, but was himself defeated and slain by the Mercians. On his death his dominions were again divided. The next important Welsh prince was Howel Dda or Howel the Good (909-50), who made himself master of the greater part of W., but did homage to King Athelstan of England. He also collected and codified an elaborate system of laws by which the people were divided into the royal class, the free tribesmen, and the non-tribesmen. From 950-1010 no supreme king ruled in W., but there were constant struggles between various petty local princes, as well as many raids on the part of Danes and Saxons. This period of anarchy was followed by the rule of two strong princes, Llywelyn ap Seisyllt and his son Griffith. Llywelyn did much to re-unite his country, which he completely freed from Danish raids. Griffith (1039-63) was a monarch of great energy. He expelled the Saxons from Gwynedd, conquered S. Wales, consolidated his dominions, and made war against England, which he three times invaded. Eventually Harold of England subdued S. Wales and defeated Griffith, who was slain by treachery (1063). The Norman conquest of England (1066) had at first little immediate effect upon Wales, distracted as she was by civil feuds. But it was not long before the Norman kings began to make encroachments, in particular placing on the Welsh borders a number of powerful barons who took advantage of the disorganised state of W. to expand their territories. The next two centuries (roughly, 1066-1282) form an epoch of continual struggle against Norman aggression. There were perpetual revolts on the part of Welsh

princes and chieftains, and in 1094 there was a brief and transient Welsh revival, led by Cadwgan ap Bleddyn, who united the Welsh people against the Normans. He met with considerable success for a time, but could not for long stem the torrent of Anglo-Norman aggrandisement. At length Henry I. made a determined effort to anglicise W., which he attacked simultaneously with three armies, reducing most of the Welsh princes to submission. They recovered much of their lost ground, however, during the civil wars of Stephen's reign. His successor, Henry II., determined at once to curb the power of the border barons and to subjugate the Welsh princes. He succeeded in establishing some semblance of order, largely through the instrumentality of Rhys ap Griffith (1132-97), a distinguished warrior and statesman, who became his ally and vassal, constantly attended his councils, and was made by him justiciar of S. Wales. Meanwhile, before the end of the twelfth century, the Welsh Church had been merged completely in the Church of England, and had lost all independence in internal affairs, Welsh bishops being consecrated by Eng. archbishops who claimed their allegiance. A formidable stand was made for independence in ecclesiastical matters by the celebrated Giraldus Cambrensis (1147-1223), but without ultimate success. The most important Welsh prince of the early thirteenth century was Llywelyn Fawr (*f.* 1194-1240), whose policy included the alliance of all the Welsh princes under his own leadership, the maintenance of friendship with the border families and the acknowledgment of vassalage to the King of England. But Llywelyn's dream of unity and concord died with him, and the dependence on England was in the highest degree distasteful to his immediate successors, of whom the most notable was David (1240-46), who for some time successfully resisted the aggressions of Henry III. The final struggle for independence was inspired and led by the famous Llywelyn ap Griffith (1254-82), who was goaded into revolt by the violence of the Eng. king's agents and by the substitution of Eng. law for Welsh custom. He refused to take the oath of fealty or do homage to Edward I., who in consequence invaded W. (1277) and compelled Llywelyn to submit to the humiliating terms of the Treaty of Conway. He accordingly did homage to Edward at Westminster in 1278, but a few years later again broke out into revolt, being exasperated by the establishment of new institutions and the exactions of the Eng. officials. Edward once again invaded W. and completely

overran the country; Llywelyn was defeated and slain (1282), and his brother David was hanged and quartered. From this moment Wales ceases to have any separate political existence. The most formidable rising against the new order was the great national movement associated with the name of Owen Glyndwr (*n.* 1400-15), the celebrated warrior and statesman. The principal results of these risings and of the havoc wrought by the Wars of the Roses were the complete destruction of the feudal system, the enormous prevalence of robbers, the appropriation by Englishmen of all positions of trust, the enactment of many severe and unjust laws against the Welsh, and the consequent growth of bitter racial feeling. The border barons continued to make unjust exactions, and the rights of citizenship were withheld from the Welsh people. Nevertheless, this period of oppression corresponds in point of time with the golden age of Welsh poetry. At length, in 1536, the Act of Union was passed by which W. was politically assimilated in all respects to England. The liberties as well as the laws of England were extended to the Principality, and W. was now for the first time given parliamentary representation. On the other hand, the Welsh language was now completely banished from the courts, and many old Welsh customs were abolished. From this time the national individuality of W. begins to decay, but she begins instead to partake in the various activities of England. In matters of religion W. was not at first very greatly affected by either the Reformation or the Puritan movement; but at the beginning of the Methodist revival about 1730 the country experienced a real religious awakening. The ferment of the Methodist movement spread over W. with lightning rapidity and culminated in a movement to secure Methodist secession from the Church of Wales. The question was only settled in 1914 by the Act of Disestablishment and Disendowment of the Church in Wales. Owing to the War, however, the Bill did not come into operation until 1920. The Church in Wales now has its own governing body of bishops, clergy, and laity, and its first archbishop, Bishop Edwards of St. Asaph, was elected at the first meeting of the governing body. Two bishops have since been added, in Monmouth, 1921, and Swansea and Brecon, 1923. The Rom. Catholic province of Wales is composed of the archbishopric of Cardiff and the bishopric of Menevia. The University of Wales, established in 1893, has four centres, in the form of constituent colleges, at Aberystwyth,

Bangor, Cardiff, and Swansea, while tutorial classes are conducted throughout the country under the aegis of the university. A notable acquisition in public buildings of W. is the celebrated Cardiff Museum of Wales, which was opened by the King in 1927. The religious revival led indirectly to a great though gradual national awakening which has since borne diverse and abundant fruit in a social, literary, and industrial revival. During the past century W. has gained enormously both in national prosperity and intellectual fruitfulness; and in recent days she has contributed to the service of the Empire a large number of illustrious citizens and statesmen, among whom it will suffice to record the names of Lord Aberdare, Sir Hugh Owen, Tom Ellis, and David Lloyd George.

Welsh Language and Literature.—Two causes have kept the Welsh language alive up to the present day, the isolation of the people among the mountains, and religion. The Snowdonian region (*Eryri*) was never conquered by England, nor has there been any incentive for any other people save the Welsh to take possession of the Carnarvonshire mountains. There the Welsh language has been spoken since the dawn of British history. Up to the Tudor period it was spoken by the upper and the lower classes, and while all the princes were patrons of Welsh poets, there are at least two of the old princes themselves who wrote mediæval verse of some worth. The Welsh language might have died soon, but for the efforts of men like John Penri, who in Elizabeth's reign gave his life for his language, with the result that the Bible was translated into Welsh in 1562. That saved the native tongue for some generations, but by the eighteenth century it was clearly becoming corrupt, and but for the Methodist revival of that time would probably by this day be among the dead languages. The revival was conducted in Welsh, and gave birth to an educational system whose development is not even yet completed. Schools sprang up in the wake of the preachers. The Bible was sold for a few pence, and the language was saved. Now Welsh is taught in the elementary and secondary schools, and its study forms one of the most popular branches at the Welsh University colleges. The publication of the first part of Professor John Morris Jones's *Welsh Grammar* in June 1913 was a notable event in the progress of the new national spirit of W. The desire of the modern scholars was to bring uniformity into the spelling, to re-introduce some of the strong and beautiful words of mediæval

Welsh, to abolish the Latinisms introduced by the scholarly translators of the Bible, and to revert to the standard of pure Welsh prose as it was written by Elis Wyn in his *Bardd Cusg* of 1703. Their efforts met with success, and the vernacular Press made a distinct advance in the purity of its vocabulary and in the use of indigenous idioms. The *Brython* newspaper took the lead in this popular movement. There are eight outstanding names in the roll of Welsh letters: four poets, Dafydd ap Gwilym, Goronwy Owen, Islwyn, and Ceiriog; and four prose writers, the author of the *Mabinogion*, Elis Wyn, Theophilus Evans, and Morgan Llwyd. Dafydd ap Gwilym lived in the fourteenth century, and as a pure poet in the style of Keats he is probably the best poet of W. He wrote many *Cynwyddau* or lyrical odes, in which Nature is painted with brilliant touches, and which gained for him the title of The Poet of the Leaves. Dafydd was a troubadour, and ranks close to Vogelweide and Ventadorn in European literature. Goronwy Owen was a purist of the eighteenth century. He had a high conception of poetry, was not a 'popular' poet, and wrote a classic ode *To the Judgment Day*. He is now studied in the schools. Islwyn is a nineteenth century blank verse writer, who, though he had very little conception of his art, wrote passages of great vigour and fervour. His influence was strong on the Eisteddfod poetry of the 'nineties. Ceiriog is the people's poet of the time of Islwyn. His muse was lyrical, and his songs are to W. what those of Burns are to Scotland. The *Mabinogion* are of European reputation, and hold an important place in the story of the Arthurian legend. The quality of the style of the *Mabinogion* has been justly praised by Matthew Arnold, while Lady Charlotte Guest has done them much justice in her beautiful Eng. translation. Elis Wyn is the best writer of Welsh prose, and though his master-book, *The Sleeping Bard*, is borrowed in idea from the Spanish of Quevedo, it is nevertheless so native in its colour, speech, and idiom that it is set to-day as the model for all generations to copy. The fifth century divides this literature into two. The early period begins with the war poetry of the fifth and sixth centuries, among which the *Gododdin* is supreme as an early epical song. Then follow the court poets of the Norman period, chief of whom is Prince Howel, whose long lyric of W. and nature and love is strangely modern in its artistry and places him high in the list of poets. At this time the *Mabinogion* were recited and written down. The period culminates

in Dafydd ap Gwilym. In the fifteenth century the nobility leave the peasants to their own devices, and Welsh song is heard only in the woods and on the roadside. This leads to the popular song of the sixteenth century as shown in Vicar Pritchard's use of it to help on religion, which develops in the first part of the eighteenth century into the perfected hymn of *Pantycelyn*. Then follows the day of the Eisteddfod culminating in Islwyn and Ceiriog. The first Eisteddfod was held in 1451, when the natural gift of the Welsh nation in drama, poetry, and music found eloquent expression. The Eisteddfod as a national institution has continued until the present time and interest in it has spread throughout the British Isles. Letters play a great share in the modern national revival, and in the persons of Professor Morris Jones, Gwynn Jones, W. J. Gruffydd, and Robert Parry the muse once more is appearing with the freshness she showed in ap Gwilym.

Welsh historical works until recently have been somewhat uncritical, but a great advance has been made in this direction and such publications as *Cymmrodor*, the transactions of the Cymmrodorian Society, and those of the Cambrian Archaeological Society are invaluable contributions to authentic history, while such works as *Wales* by O. M. Edwards in 'Stories of the Nations,' and *The Making of Modern Wales*, by Llewelyn Williams, with *The Welsh People*, by Rhys and Brynmor Jones, are worthy of study. The outstanding novelist of the nineteenth century was Daniel Owen (1836-95), whose studies of Welsh home-life are acknowledged to be in the front rank. Modern Welsh poetry has shown a changed outlook. The younger poets manifest an impatience with sentimentality and reveal a greater sincerity than many leading authors of other countries who were carried away by the tide of emotionalism after the War. The works of such poets of to-day as R. William Parry, A. G. Prys-Jones, and the Anglo-Welsh poets W. H. Davies and Richard Hughes, whose *Ecstatic Ode on Vision* is full of beauty, are typical of the present-day revival in Welsh poetry. While there are signs of a great national movement in Welsh music, beyond the prominent figure of Sir Walford Davies, there has not yet appeared any outstanding composer. Sir Walford Davies, the Director of Welsh Music, has done, and continues to do, great work in choral music and composition and is well known throughout the British Isles for his work in musical education.

Consult Sir O. Edwards, *Wales*

1925; Sir J. Rhys and Sir D. Jones, *The Welsh People*, 1927.

Wales, Calvinistic Methodist Church in, is Calvinistic in its doctrine and Presbyterian in its organisation. It is modern in its origin, and owes its beginnings chiefly to the preaching of Howell Harris and others from 1735 onwards. Later, George Whitefield came into touch with them and aided them in their work. The connection, however, between the Eng. and Welsh Methodists ceased before 1750. Its first General Synod was held in 1811. The C.M.C. in W. has over 3200 churches and chapels, etc., and about 190,000 communicants.

Wales, Edward Albert Christian George Andrew Patrick David, Prince of, heir-apparent to the crown, *b.* 1894, at White Lodge, Sheen. He



H.R.H. THE PRINCE OF WALES

was created Prince of Wales on his sixteenth birthday, and, before attaining his majority, in 1912, he had completed his naval education at Osborne and Dartmouth, being gazetted midshipman in 1911 on the *Hindustan*, where he earned a reputation for hard work. He went into residence as a commoner of Magdalen, Oxford, in Oct. 1912. Was promoted to lieutenant in March 1913. Was attached to the staff of Sir John French (later Lord Ypres) on the Western Front in 1914. Appointed staff captain with the Mediterranean Expeditionary Force in 1916, and promoted to D.A.Q.M.G. in the same

year. In 1917 he paid a visit to the Italian front. Became colonel-in-chief of the Cadet Corps in 1918, his challenge shield being a much-coveted trophy among cadet boxing teams. In 1917 was appointed colonel-in-chief of the 12th Lancers and of the Royal Scots Fusiliers (*q.v.*). Made a freeman of the City of London and High Steward of Plymouth in 1919. Visited Canada, where he has a ranch at Calgary, and also the U.S.A. in August 1919, being enthusiastically welcomed in both countries. Has visited many other parts of the Empire, including Australia, 1920, India, 1921, and Africa, 1925; also visited Canada again in 1923 and S. America in 1925 and 1931. On his second Canadian visit was made a Privy Councillor for that Dominion. Made a notable speech on salesmanship in 1926 in support of British trade. Made President of the British Association at Oxford in 1926. Assumed the title of Master of the Merchant Navy and Fishing Fleets, 1928. He also holds the titles of Earl of Chester (1910), Duke of Cornwall, Earl of Carrick, Baron of Renfrew, Lord of the Isles, Grand Steward or Seneschal of Scotland, and is a Knight of the Garter (created 1911), of the Order of the Thistle (created 1922), and of the Order of St. Patrick (created 1927).

Wales, New South, see **NEW SOUTH WALES**.

Wales, Prince of. The eldest son of the King of England becomes at birth Duke of Cornwall, and on his succession to the throne the duchy vests in his eldest son; but the king can, if and when he chooses, create his son P. of W. and Earl of Chester by letters patent. It is now customary always to make the heir-apparent to the throne P. of W., but the title is not heritable. The life of the P. of W. and the chastity of his wife are protected by the Statute of Treasons (*see* TREASON). Provision is made for the Prince and Princess of Wales by the Civil List Act, 1901. Apart from restrictions as to his marriage and his protection by the law of treason, the status of the P. of W. is to a great extent that of an ordinary subject, *e.g.* he may sue and be sued in the ordinary manner, though in such case he is always represented by the Attorney-General of the Duchy of Cornwall. The custody and education of the P. of W. are in the control of the reigning sovereign.

Wales, University of, was founded in 1893 from a union of the colleges of Aberystwyth, Bangor and Cardiff. These three still remain the constituent colleges of the university, none taking precedence of the others. There are associated theological colleges at Bala, Brecon, Aberystwyth,

Carmarthen, Cardiff, and Bangor. The university grants degrees in arts, medicine, law, music, and science.

Walfish Bay (Walvisch, or Walwich) a bay on the W. coast of Africa and a div. belonging to Great Britain, and has for administrative purposes been included in the territory of S.W. Africa. It consists of a stretch of sand and a small peninsula, the area being about 430 sq. m. Most of the imports of S.W. Africa are landed at W. B., which is to be developed into a port. It has a $3\frac{1}{2}$ k.w. wireless station. Pop. 3100.

Walhalla, see VALHALLA.

Walker, a tn. in the co. of Northumberland, England, 3 m. E. of Newcastle, on the R. Tyne. Manufs. chemicals and has iron foundries and shipbuilding. Pop. 15,800.

Walker, Francis Amasa (1840-97), an American soldier and political economist, b. in Boston, Massachusetts. He became secretary of state for Massachusetts (1851-53); representative of Congress (1862-63); professor of political economy at Yale (1873-81), and president of the Massachusetts Institute of Technology. His chief writings are: *The Wages Question*, 1876; *Money*, 1878; *Land and its Rent*, 1883; *International Bimetallism*, 1896, etc.

Walker, Frederick (1840-75), an Eng. painter, b. in London, studied there at the British Museum, National Gallery, and elsewhere. About 1858 he took up engraving and apprenticed himself to Whimper. From this he became known as an illustrator. He illustrated some of Thackeray's work.

Walker, George (1618-90), an Eng. clergyman distinguished by his gallantry in the siege of Londonderry (1689) (see IRELAND). Son of a Yorkshreman who became Chancellor of Armagh. His birthplace is variously given as Tyrone and Stratford-on-Avon. Educated at Glasgow University, but there is no satisfactory documentary evidence of his career there. He held various livings, among them that of Donaghmore near Dungannon. In 1688 when Londonderry was on its defence he raised a regiment and later, by order of Lundy, the governor, set out with several companies to Omagh and thence, after the abandonment of Coleraine to the Jacobites, he marched to Londonderry, where he found himself in considerable danger. Lundy, the governor, was in W.'s view unreliable if not treacherous, and hence W. and another patriot connived at Lundy's escape and became joint governors of Londonderry. W. encouraged the defence with a rare gallantry and with sermons of an inspiring character. After the raising of the siege he went to

London, where he pub. an account of the siege in 1689. This diary or account was promptly answered by Mackenzie, Presbyterian chaplain in W.'s regiment, who traversed W.'s statements in numerous particulars but, in his rejoinder, W. seems to have had little difficulty in refuting him. At the king's request W. sat to Kneller. Later William III. appointed him to the bishopric of Derry, but W.'s affections seem to have been still with the forces, for he accompanied them to the Battle of the Boyne where he was killed.

Consult Memoir by A. Dawson in *Ulster Journal of Archaeology*, vol. ii.

Walker, Thomas Barlow (1840-1928), American lumberman and philanthropist, b. at Xenia, Ohio, Feb. 1. In 1882, he organised the Red River Lumber Company, and later became the largest timber-land operator in the North-west and one of the greatest in the U.S.A., with holdings in Minnesota and California, which brought him a fortune estimated at 100,000,000 dollars. W. was one of the pioneer builders of the city of Minneapolis and its greatest benefactor, giving the city its library and the Walker Art Galleries, while being mainly responsible for the institution of the Minneapolis Academy of Science. Died at Minneapolis, July 28.

Walker, William (1824-60), an American adventurer, b. at Nashville, Tennessee. He studied medicine in Germany, then drifted into journalism in New Orleans and San Francisco, and practised as a barrister in California. W.'s first military exploit occurred in 1853 when he got together an expedition whose object was to capture the state of Sonora in Mexico. He proclaimed himself president of the Pacific Republic, but after a while he was compelled to surrender to the U.S. military authorities. His next adventure was with the Nicaraguans. His interference in Nicaraguan politics involved him in trouble with Costa Rica. One or two inconclusive battles were fought, but W. remained in supreme authority in Nicaragua. As the result of various insurrections against his rule, W. was deposed from his presidency and taken to New Orleans by the U.S. authorities. After several other intrigues and episodes with various S. American states he was tried by court-martial and shot in Honduras.

Walking, see ATHLETICS.

Walkley, Arthur Bingham (1855-1926), Eng. dramatic critic. Educated at Warminster School and Balliol, Oxford. He entered the Post Office, becoming Asst. Secretary in 1911. He also acted as dramatic critic to *The Times* and other papers.

Published *Playhouse Impressions*, 1892; *Frames of Mind*, 1899; *Dramatic Criticism*, 1903; *Drama and Life*, 1907; *Pastiche and Prejudice*, 1921; *More Prejudice*, 1923; *Still More Prejudice*, 1925.

Walkyries, see VALKYRIES.

Wall, Great, of China, see CHINA.

Wallaby, see KANGAROO.

Wallace, Alfred Russel (1823-1913), Eng. naturalist, b. at Usk, Monmouthshire; he began life as an architect, but interested himself in botany. He became a schoolmaster in a private school in Leicester, and made the acquaintance of H. W. Bates. In 1848 the two friends set out for the Amazon, but separated later. A large part of his collection was burnt with the ship in which W. was returning. From 1854 to 1862 W. was in the Malay Archipelago; here he established the 'Wallace Line,' zoologically separating Lombok and Celebes from Bali and Borneo. His own work and the reading of Malthus' *Essay on Population* led him to the idea of the 'survival of the fittest,' as a correlation of natural selection, and his own formulation of the law that every species originates at the same time and in the same locality as a pre-existing closely allied species. He wrote immediately to Darwin, who received the letter on June 18, 1858. Darwin noted the extraordinary coincidence of views, and communicated with Sir C. Lyell and Sir Joseph Hooker the same day. As a result a joint paper was read, containing Darwin's views, to the Linnean Society on July 1, 1858. W.'s *Contributions to the Theory of Natural Selection* appeared in 1871, and contained his views on evolution, differing in certain aspects from Darwin. These points are clearly set forth in *Darwinism*, pub. in 1889. In particular he insists on a 'spiritual' influence in man's development, marking clearly a departure from the realm of pure science. This tendency was exaggerated in his excursions into spiritualistic circles, an account of which forms a very disproportionate amount of *My Life* (new ed. 1908). In 1887 he toured the U.S.A. and Canada, delivering six Lowell lectures in Boston. Later in life he interested himself in the social problems of his times. The Royal Medal in 1868 and the first Darwin Medal, 1890, were presented to him by the Royal Society. He was president of the Entomological Society in 1870-71. In 1889 he received the degree of D.C.L. from Oxford University. In 1881 he received a pension at the hands of Mr. Gladstone. Among his writings are: *Travels on the Amazon*, 1853; *The Malay Archipelago*, 1869; *Island Life*, 1880; *Geographical Distribution*

of Animals, 1876; *Land Nationalisation*, 1882; *Forty-five Years of Registration*, 1885; *The Wonderful Century* (new ed.), 1903; *Man's Place in the Universe* (new ed.), 1904; *The Revolt of Democracy*, 1913; *Social Environment and Moral Progress*, 1912. See J. Marchant, A. R. Wallace: *Letters and Reminiscences*, 1916.

Wallace, Edgar (1875-1932), Eng. novelist and playwright. Left a destitute orphan, he was saved from the workhouse by a fish porter, named George Freeman, and his wife, who brought him up. Went to a Board school in Peckham and then worked in a rubber factory, on a Grimsby trawler, and as a milk-boy and newspaper-seller. He then joined the army and was in S. Africa during the war of 1899-1902. On leaving the army he decided to turn journalist and returned to S. Africa as war correspondent for Reuter's agency. Later he worked at different times for the *Daily News*, *Daily Mail* and other London papers. Still penniless in these years, it was not till 1907 that the publishers took some interest in the 'thriller' novels that were to make of W. the most successful storyteller of his age. His first story was *The Four Just Men*, which he pub. at his own expense. The book proved a success and W. received £75 for the copyright from publishers who eventually sold millions of copies of it. After this, W., with amazing energy, wrote or dictated about 150 novels in the space of twenty years, besides writing a number of plays and newspaper articles—these latter mainly concerned with the turf. His earlier stories were tales of colonial adventure, but he quickly found his true métier with the 'thriller'—peculiarly his own creation, which he himself styled 'pirate stories in modern dress.' The stories and plays of W. carried their public along the high tide of their unflagging gusto, and his undoubted acquaintance with the types he portrayed lent realism to his most melodramatic wares. Of his plays, *On the Spot*, which was a skit on American gangsters, was his biggest success. Others almost equally successful were *The Ringer*, *The Squeaker*, and *The Calendar*—this last a racing play. He d. of pneumonia in Feb. while on a visit to Hollywood, U.S.A. Among his works are *Smithy's Friend Nobby*; *Sanders of the River*; *The Man who Bought London*; *Bones*; *The Melody of Death*; *Kate plus Ten*; *The Clue of the Twisted Candle*; *Heine, the Spy*; *Sanders*; *The Traitor's Gate*.

Wallace, Lewis (Lew) (1827-1905), an American soldier and writer, b. at Brookville, Indiana. He fought in

the Mexican War (1846-47) and as a Federalist in the Civil War (1862-64), taking part in the capture of Fort Donelson (1862). He was appointed governor of New Mexico Territory (1878-81) and ambassador to Turkey (1881-85). His novels include *Ben Hur*, 1880, which achieved a great success; *The Prince of India*, 1893, and *The Wooing of Malkatoon*, 1898.

Wallace, Sir Richard (1818-90), an Eng. art connoisseur, *b.* in London, the natural son of the Marchioness of Hertford. He was educated in Paris, where he gathered together a valuable collection, sold in 1857. He then helped the Marquis of Hertford, his half-brother, in forming his collection, which he inherited in 1876, and which was bequeathed by his widow to the British nation in 1897, and is now housed in Hertford House, Manchester Sq., London.

Wallace, Sir William (c. 1272-1305), a Scottish patriot, *b.* probably at Elderslie, near Paisley. He came of a family whose members were enemies of England; he first took up arms against the Eng. in 1297. It was an opportune moment for a Scottish rising. Edward I. had taken advantage of the dispute as to the succession to the Scottish throne to possess himself of the country. In 1296 he ravaged the country and made prisoner John de Balliol, at the time the occupant of the Scottish throne. John de Warenne was appointed guardian of Scotland, and Eng. sheriffs were set up in the southern shires, and in Ayr and Lanark. In 1297 the Eng. barons and clergy were in revolt against Edward I., while he was absorbed in preparations for the Fr. war. Thus W. seized his opportunity, he organised the Scottish insurgents in the name of John de Balliol, killed Sir William Hezelnig, the Eng. sheriff of Lanark, and became joint warden of Scotland. He next drove the Eng. out of Perth, Stirling, and Lanark shires, besieged Dundee and Stirling castles, and defeated the Eng. at Stirling Bridge. All this was the work of 1297, but after ravaging Northumberland, Westmorland, and Cumberland, he was defeated by Edward I. at Falkirk (1298) and resigned the wardenship of Scotland. After this he withdrew to France and solicited aid from Norway, France, and the pope; but being refused, returned to Scotland, and carried on a guerrilla warfare (1303-05). He was declared an outlaw by Edward I. (1304), and having been captured by treachery at Glasgow (1305), was brought to London, tried, and executed the same year.

Wallace, William Vincent (1814-65), an Irish composer, *b.* in Waterford.

He was leader of the orchestra in a Dublin theatre for a number of years. His first opera, *Martiana*, was produced in 1845 and was a success. He toured the U.S.A. and S. America and travelled in Germany. Other operas of his are: *Lurline*, 1860; *The Amber Witch*, 1862; and *Love's Triumph*, 1862.

Wallace's Line, an imaginary line which separates the Oriental from the Australian faunas. It was so called in compliment to Alfred Russel Wallace (*q.v.*), who defines the course in his *Island Life*, 1880. The line passes between the Sulu and Philippine Is., along the Straits of Macassar and between Lombok and Java, and the fauna to the W. of it is strikingly different from that E. of it, although the opposite shores of dividing waters are sometimes only a few m. apart.

Wallasey, a co. bor. (since April 1, 1913) of Cheshire, England, in the Wirral Peninsula, 3 m. N.W. of Birkenhead. The Wallasey Embankment was constructed to prevent the encroachment of the sea on the Wirral Peninsula. There are submerged remains of an anct. forest. Pop. (1931) 97,500.

Walla Walla, co. seat of Walla Walla co., Washington, U.S.A., on Mile Creek. It is the centre of an important wheat-growing dist., and consequently has flour mills. It is an educational centre, having the Whitman College, the Walla Walla College, and the Whitman Conservatory of Music. Pop. (1930) 15,700.

Wallenstein, or Walstein, Albrecht Wenzel Eusebius von (1583-1634), Duke of Friedland, *b.* in Bohemia. His father was a Protestant, but he early determined to embrace the Catholic faith. Took part in the war between the Archduke Ferdinand and the Venetians. On the outbreak of the Bohemian revolt he obtained the command of an army, defeated Mansfeldt (*q.v.*), and conquered a great stretch of country. He was created Duke of Mecklenburg by the emperor. Resigned his command in 1630, but had it restored again the next year. In 1632 Gustavus Adolphus invaded northern Germany. W. met him at Lützen, Nov. 1632, and a fierce battle took place, but in spite of W.'s efforts the battle was a triumph for the Protestants. Gustavus, however, was killed. Seeming to lack vigour in continuing the war, he was accused of aiming at sovereignty, and was disgraced. He retired to Egra, where he was murdered. Schiller dealt with his life both in prose and in poetry. See *Life* by L. von Ranke, 1910.

Waller, Edmund (1606-87), an Eng. poet, *b.* at Colleshill, Bucks. He was a student of Lincoln's Inn in

1622, and four years later was M.P. for Chipping Wycombe, and for Amersham in 1628 and 1640. In this latter year he sat in the Long Parliament, and was chosen by the House to conduct the impeachment of Crawley for his judgment in the ship-money case. But he was at heart a royalist, and having been caught plotting to seize London for Charles I., was arrested and expelled the House (1643). He was a prisoner in the Tower (1643-44), but his sentence of death was commuted to a heavy fine and banishment. He was, however, pardoned in 1651 by Cromwell's influence, and pub. laudatory verses upon him in 1655 entitled *A Panegyric to my Lord Protector*. But he also wrote poems of rejoicing on Cromwell's death (1658), and in 1660 pub. *To the King, upon his Majesty's Happy Return*. His *Divine Poems* appeared in 1685. Critical ed. with memoir by G. T. Drury, 1893.

Waller, Sir William (c. 1597-1668), an Eng. soldier and parliamentarian, was the son of Sir Thomas W., Lieutenant of Dover. Becoming a soldier, he served in Bohemia (1620) and the palatinate (1621-22), and at the outbreak of the Civil War was made a colonel in the parliamentary army. He took Portsmouth (1642), Hereford (1643), and Arundel Castle (1644), but was removed from command in 1645 by the self-denying ordinance and became a Presbyterian leader in parliament. In 1647 he began to levy troops to resist the army, and was imprisoned by that faction (1648-51). He was again arrested in 1659 and imprisoned for having plotted a royalist rising, but recovered his seat in parliament (1660), and sat on the council of state the same year.

Wallflower (*Cheiranthus cheiri*), a fragrant cruciferous perennial plant, a number of beautiful varieties of which are now grown in gardens, bearing yellow, brown, red, and variegated flowers. They are usually treated as biennials, the seed being sown in May.

Wallingford: (1) A parl. bor. of Berks, Eng., on the r. b. of the Thames, about 50 m. from London. It is a market tn. for an agricultural dist.; it has anct. Rom. remains, and appears in the Domesday Book. It has some interesting churches. Pop. (1931) 9700. (2) A tn. in New Haven co., Connecticut, U.S.A., with silver-plate works and manufs. of buttons, britannia and brass ware. There are insulated wire factories and steel mills. Agriculture and fruit-growing are carried on in the dist. Pop. (1930) 11,170.

Wallington, a par. of Surrey, Eng., 2 m. S.W. of Croydon, noted for its cultivation of lavender. Pop. 5200.

Wallis, John (1616-1703), an Eng. mathematician, was Savilian professor of geometry, Oxford, 1649-1703, and keeper of the archives, 1658-1703. He introduced the principles of analogy and continuity into mathematical science, and widened the range of the higher algebra. He pub. *Arithmetica Infinitorum*, 1655, which contained the germs of the differential calculus, and invented the symbol ∞ for infinity.

Wallon, Alexandre Henri (1812-1904), a Fr. historian and politician. The work which he did towards the establishment of the laws of the Republic of 1875 earned for him the title in the political world of 'Father of the Constitution.' Among his works are: *The Authority of the Bible*, 1889; and *Monotheism among the Semitic Races*, 1859.

Walloons, inhabitants of certain parts of Belgium, who speak a Romance dialect which is of the same group of languages as modern Fr., but contains also some Celtic roots. Phonologically it tends to narrow the vowels or to render them indeterminate as contrasted with Fr. The people in appearance resemble the Cornish.

Wall-paper, a coloured or decorated paper used as an ornamental covering for the inner surface of the walls of a room. Plain coloured paper may be 'ingrain,' when the colour runs throughout the substance of the paper, or printed, when the colour is only on the surface. Some of the best patterned papers are 'hand-printed'; that is, the colours are laid on with wooden blocks, the finer details being supplied by strips of copper placed edgewise in the block. A large number of excellent papers are machine-printed, and these are usually cheaper. The price is not a good index of the artistic or intrinsic value of a W. In calculating the number of pieces of W. needed for a room, it should be remembered that a piece of Eng.-made paper measures 12 yds. by 21 in., Fr. paper 9 yds. by 18 in., and Japanese paper 12 yds. by 36 in.

Wallsend: (1) A tn. and mun. bor. of Northumberland, Eng., situated on the Tyne. Its name is taken from its position at the E. end of Hadrian's Wall (q.v.). Its chief industries are shipbuilding, metal smelting and manufacture, and chemicals. Pop. 41,600. (2) A tn. of New S. Wales, Australia, 13 m. from Newcastle, a great colliery centre. Pop. 5000.

Wall Street is to the city of New York what 'The City' is to London—the centre of the financial activities of the nation. It is a narrow thoroughfare seven blocks long which runs from Trinity Church in Broadway to the East R. Hence, with

grim allusion to those who fail in financial speculations there, it is often referred to by New Yorkers as the street which begins at a graveyard (around old Trinity Church) and ends in a riv. In Wall Street and the thoroughfares in the immediate proximity are located most of the great banks, trust companies, insurance corporations, as well as the head offices of the big railway, steamship, metal, and coal companies. In this dist. are also located the Stock, Coffee, Cotton, Metal, Produce, and Corn Exchanges. In the middle W. the term 'Wall Street' is one of opprobrium, referring to the money powers which have such a big influence in American life and politics. See R. L. Warshaw, *The Story of Wall Street*, 1931.

Walmer, or Walmerstreet, a tn. and watering-place on the coast of Kent, Eng. It was in anct. times one of the Cinque Ports, and is one of the reputed landing-places of Julius Cæsar. Walmer Castle is a relic of the days when it was an important place to be defended from foreign inroads. Pop. 5300.

Walnut (*Juglans regia*), a handsome and useful tree; the Eng. variety, the Persian W., is hardy though not a native. Other varieties are found in the Far East; also the Black W. in America. Besides its nuts, which are of much value as a dessert delicacy, the wood is in great demand by cabinet-makers. Sugar has been made from the sap, and the aromatic leaves have been used in pharmacy. The rind of the fruit yields a dark brown dye, and the seeds contain an oil used by painters as a drying oil.

Walpole, Horace, fourth Earl of Orford (1717-97), b. in London, being the youngest son of Robert W., the Eng. statesman. Even while at school he was well provided for by the sinecures which, by the influence of his father, he held. At the age of twenty-two he started on a Continental tour, which formed so essential a part of the education of the gilded youth of the eighteenth century. He visited France and Italy together with the poet Gray. Whilst on the tour he met Horace Mann, with whom he maintained a correspondence for some very considerable period. He returned to England, having quarrelled with Gray, and entered parliament. He held a seat in parliament continuously up to 1768. It is, however, not as a politician but as an author that he is famous. His memoirs and correspondence are of the greatest importance to students of the life and times of the middle eighteenth century. He lived at Strawberry Villa, Twickenham, from 1747, and his house be-

came the centre of fashionable learning in England. He set up a printing press there and pub. much that was his own and his friends'. Gray's *Odes* were issued from here, as was the *Castle of Otranto*, which established the vogue of the 'terror novel.' As an antiquary he pub. the following works: *Catalogue of the Royal and Noble Authors of England*, 1758; *Life and Reign of Richard III.*, 1768; *Anecdotes of Painting in England*, 1762-71. Amongst the more important of his memoirs may be mentioned: *Memoirs of the Last Ten Years of the Reign of George II.*; *Memoirs of the Reign of George III.*, 1771; and *Journal of the Reign of George III.*, 1771-83. W.'s *Letters* have been collected and chronologically arranged by Mrs. Paget-Toynbee, 1903-25. See also *Life* by Austin Dobson, 1890; L. B. Seeley, *Horace Walpole and his World*, 1884; *Walpole's Letters to Sir Horace Mann* (Review and Essay by Lord Macaulay), 1833; P. Yvon, *Horace Walpole: Essai de biographie psychologique et littéraire*, 1924; D. M. Stuart, *Horace Walpole* (Eng. Men of Letters); L. Melville, *Horace Walpole*, 1930; *Horace Walpole's Fugitive Verses*, ed. W. S. Lewis, 1931; S. Gwynn, *The Life of Horace Walpole*, 1932.

Walpole, Hugh Seymour, Eng. novelist; b. 1884; son of Rev. Geo. Somerset W., rector of Auckland, N.Z., and afterwards Bishop of Edinburgh. Left N.Z. aged five; lived a year at Truro, Cornwall; afterwards sometimes in New York. Educated: King's School, Canterbury; Emmanuel College, Cambridge. A year with Liverpool Missions to Seamen. Began to write, 1908. During first two years of Great War, with Russian Red Cross, Galicia front. Works include: *The Wooden Horse*, 1909; *Maradick at Forty*, 1910; *Mr. Perrin and Mr. Traill*, 1911; *The Prelude to Adventure*, 1912; *Fortitude*, 1913; *The Duchess of Wreze*, 1914; *The Golden Scarecrow*, 1915; *The Dark Forest*, 1916; *Joseph Conrad* (study), 1916 (revised 1924); *The Green Mirror*, 1918; *The Secret City*, 1919; *Jeremy*, 1919; *The Captives*, 1920; *The Young Enchanted*, 1921; *The Cathedral*, 1922; *Jeremy and Hamlet*, 1923; *The Old Ladies*, 1924; *Portrait of a Man with Red Hair*, 1925; *Harmer John*, 1926; *Jeremy at Crale*, 1927; *Wintersmoon*, 1928; *The Silver Thorn*, 1928; *Anthony Trollope* (study), 1928; *Hans Frost*, 1929; *Rogue Herries*, 1930; *Judith Paris*, 1931. Walpole, Robert (1676-1745), an Eng. statesman, b. at Houghton in Norfolk. A Whig by persuasion

and upbringing, he entered parliament in 1701 as M.P. for Castle Rising, and in the next parliament, the first of the reign of Queen Anne, for Lynn. He quickly distinguished himself, and in 1708 he became Secretary for War. On the accession of the Tories in 1710 he was accused of peculation, a somewhat fashionable crime and charge, and was dismissed his office and sent to the Tower. The Protestant succession, however, restored him to favour, and in 1715 he



ROBERT WALPOLE, EARL OF ORFORD

became Chancellor of the Exchequer, and practically George I.'s chief minister. On the dismissal of Townshend, he also resigned and opposed strongly the policy of Stanhope and Sunderland. His greatest victory in opposition was the rejection in 1713 of the Peerage Bill, which limited the prerogative of the crown and which would have increased enormously the power of the House of Lords. The mania for speculation culminated in 1721 in the South Sea Bubble, public credit was at a discount, and the country seemed to be on the verge of ruin. But W. made these ruins stepping stones to success. He became the chief minister. No longer, he declared, should the firm be Townshend and Walpole, but Walpole and Townshend. He now became the virtual ruler of England, and her first Prime Minister. Since the king spoke only Ger. and could

not understand Eng., W. presided over the cabinet. His policy was a policy of peace. As a financial minister, few have equalled him. He had no high ideals, but was actuated throughout by motives of strong common sense. On the death of George I. his position seemed to be imperilled, but Caroline of Anspach realised his true ability, gave him her support, and kept him in office. His excise scheme of 1733 would have made London a free port, but was not popular since it was not understood. He remained in office until 1742. In 1739 the war of 'Jenkins' Ear' was declared, and W. ought to have resigned since he had declared war much against his will, but he clung obstinately to office, and only resigned when his majority had dwindled to two. His enemies tried to impeach him, but he was still strong enough to escape that. He was raised to the peerage as the Earl of Orford, and d. three years after he had given up office. See Cox, *Life of Walpole*, 1798; Morley, *Walpole* (Twelve Eng. Statesmen); G. R. Stirling-Taylor, *Robert Walpole and his Age*, 1931.

Walpurga, St. (Walpurgis or Walburga) (d. c. 779), followed her brothers St. Wilibald and St. Wunnibald (sons of a king of the West Saxons), in the time of St. Boniface, from her native country, England, to Germany, to help them in extending Christianity. After the death of Wunnibald she directed his convent at Heidenheim until her death. Her bones, from which, according to the oldest biography, a miraculous healing oil flowed, were transferred to Eichstadt, where a convent was erected in her honour. Throughout all Germany, and even in France, the Netherlands, and England, churches and chapels were dedicated to her. The feast of W. falls properly on Feb. 25, but in some Ger. calendars it is assigned to May 1, which day, with its promise of returning summer, was already associated with various heathen celebrations, from which the annual Witches' Sabbath on Walpurgis-Night took form. (See Goethe's *Faust*.) Although St. W. gave her name to this orgy of witches and devils on the Brocken, she is also regarded as having the power to ward off magic influences.

Walrus, Sea Horse, Sea Cow, or Morse (*Trichechus rosmarus*), a large marine carnivore confined to the Arctic Circle, though formerly of much wider range, it having been ruthlessly hunted for its immense tusk-like upper canines, its hide, and its oil. It is a gregarious animal, and quiet and inoffensive in disposition

except during the breeding season, or if attacked, when it is capable of fighting fiercely and of inflicting terrible blows with its tusks by quick turns of the neck. It averages 10 to 12 ft. in length, though specimens nearly twice as long are recorded. The muzzle is divided between the nostrils, and bears bristly moustaches. The eyes are small, and there is no external ear. The adult animal has only one incisor and three premolar teeth at each side of the upper jaw besides the tusks; in the lower jaw only three premolars and one small canine occur on each side.

Walsall, a market tn., co. and municipal bor. of Staffordshire, England, 8 m. N.W. of Birmingham. It has trade in harness, saddlery, and leather goods as well as in engineering and hardware. Pop. (1931) 103,100.

Walsh, Thomas James, American lawyer and senator; b. June 12, 1859, at Two Rivers, Wis., U.S.A.; son of Felix W. Graduated, 1884, University of Wisconsin. Practised at Redfield, S. Dakota; removed, 1890, to Helena, Mont. U.S. senator (Dem.), 3 terms, 1913-31. Presided at Democratic National Convention, 1924. Helped to draft Prohibition and Women's Suffrage Amendments to Constitution. Part author of Federal Reserve (Banking) Act. Initiator of the investigation into illegal leasing of oil reserves under President Harding.

Walsh, William (1663-1708), an Eng. poet and critic, b. at Abberley, Worcestershire. He sat in parliament for Worcester (1698, 1701, 1702), and for Richmond (Yorkshire) (1705-08). He was a friend and correspondent of Pope, and a literary collaborator of Vanbrugh and Congreve. His writings include a *Dialogue Concerning Women*, 1691; *Letters and Poems*, 1692; and *Æsculapius*, 1714. See his *Letters* in Elwin and Courthope's edition of Pope (vol. vi.), and *Life* by Cibber, 1753.

Walsingham, a tn., Norfolk, Eng. Has an Augustinian priory (twelfth century) with a shrine of the Virgin much visited by mediæval pilgrims. Pop. of rural district (1931) 15,800.

Walsingham, Sir Francis (c. 1530-90), an Eng. statesman, was educated at King's College, Cambridge. He travelled, during Queen Mary's reign, studying foreign politics, but on the accession of Elizabeth returned to England, and in 1569 acted as chief of the secret service in London. He was envoy to Paris to ask indulgence for the Huguenots, 1570, and two years later protected the Eng. Protestants during the St. Bartholomew massacre. From 1573 to 1590 he was secretary of state, and was frequently employed by Elizabeth in

foreign affairs although she neglected his advice. He secured the conviction of William Parry, 1585, Anthony Babington, 1586, and Mary, Queen of Scots, 1586, and it was he who urged upon Elizabeth, in 1587, the necessity for preparing for the Armada.

Walsingham, Thomas (d. c. 1422), an Eng. monk and historian, was preceptor and superintendent of the scriptorium of St. Albans Abbey, and afterwards prior of Wymondham. He is the principal authority for the reigns of Richard II., Henry IV., and Henry V. He compiled *Chronicon Anglie*; *Ypodigma Neustrie*, a record of events in Normandy; and *Chronica Majora*, now lost.

Walter, John, name of three persons successively proprietors of *The Times* (q.v.) newspaper: (1) (1739-1812) Founder and first editor; son of a London coal-merchant, whose business he followed prosperously till 1781. Was also underwriter till 1782. Set up a printing business in Printing-House Square, 1784. Printed, Jan. 1, 1785, first number of *Daily Universal Register*; renamed *The Times*, Jan. 1, 1788. Imprisoned for libels, 1789-91 and 1799. Died at Teddington, Nov. 16. (2) (1776-1847) Chief proprietor; b. Feb. 23, probably at Battersea; second son of founder. Educated: Merchant Taylors' School; Trinity College, Oxford. Succeeded elder brother William as manager, 1803. Editor also till c. 1810. M.P.: Berks, 1832-37; Nottingham, 1841—unseated 1842. Died in Printing-House Square, July 28. (3) (1818-94) Chief proprietor; b. in Printing-House Square; eldest son of last-named. Educated: Eton; Exeter College, Oxford—graduated 1840. Called to Bar, Lincoln's Inn, 1847. Sole manager on father's death. M.P.: Free-Trade Conservative, Nottingham, 1847-59; Liberal, Berks, 1859-65, 1868-85. Died at Bear Wood, Nov. 3.

Waltham, a city of the U.S.A., in Middlesex co., Massachusetts. It has the American Waltham Watch Company, the largest watch factory in the world, and numerous cotton mills, the first one in America being established here in about 1814. W. manufs. also rivets, dials, and gauges, rubber goods, electrical equipment, heating equipment, and pianos. The city also produces automobiles, carriages and wagons, bicycles, organs, saddlery, harness, furniture, and men's clothing. Pop. (1930) 39,247.

Waltham, Waltham Abbey, or **Waltham Holy Cross**, an anct. market tn. on the R. Lea, 12½ m. from London. The first notice of it occurs in the reign of Canute, but it is

now famous chiefly for its anct. abbey church. There are also large powder-mills belonging to the gov. Area 11,016 acs. Pop. (1931) 7116.

Walthamstow, an urban dist., Essex, and suburb of London. Pop. (1931) 133,000.

Walther von der Vogelweide (c. 1160-1230), the greatest of the Ger. minnesingers, was probably a native of Tyrol. He was of noble birth, and having learned his art under Reinmar the Old, found a patron in Duke Frederick I. at the court of Vienna, where he stayed until 1198. Later he visited several tns., including Mainz and Magdeburg, and in 1204 won the poetical contest at the Wartburg.

Walton, Izaak (1593-1683), Eng. author, b. at Stafford. He was apprenticed to an ironmonger in London after very little schooling, and by 1614 was in possession of a business of his own. He had before 1619 begun to write verses, and in 1640 he prefixed a life of Donne to the first folio edition of that author's *Sermons*, which was much approved by John Hales. He afterwards issued separately an improved edition of his *Life of Donne* (1658). In 1651 he pub. *Reliquiae Wottonianae* with his *Life of Sir Henry Wotton*, and two years later produced his famous treatise *The Compleat Angler, or the Contemplative Man's Recreation*. The first edition differs materially from the second, which appeared under W.'s superintendence in 1655. The former is in the form of a dialogue between Piscator and Viator, while the latter has three characters, Piscator, Venator, and Auceps. In 1665 he gave to the world his *Life of Richard Hooker*, and in 1670 appeared his *Life of George Herbert*, followed in 1678 by that of *Bishop Sanderson*. Cotton's dialogue between Piscator and Viator was pub. as a second part in the fifth edition of *The Compleat Angler*. A complete ed. of W., ed. G. Keyner, was pub. 1929.

Walton, William Turner, Eng. composer; b. March 20, 1902, at Oldham, Lancs. Won probationership at Christ Church Cathedral Choir School, Oxford, at age of ten; became undergraduate of Christ Church at sixteen. Studied at first under Sir Hugh Allen and E. J. Dent; studied latterly by himself. In 1923 he became known as the composer of a string quartet (1922) which was performed at the Salzburg Festival; and of *Façade* (1923), to accompany a series of poems by Edith Sitwell, performed at Aeolian Hall, June 12. In 1929 his competent viola concerto appeared, and when the striking choral work, *Belshazzar's Feast*, was given in 1931 he definitely came to the notice of the general public and is often credited with

having perhaps the most potentialities of any composer in England. Other works: Quartet, pianoforte and strings, 1918; *The Passionate Shepherd*, for tenor and small orchestra, 1920; *Dr. Syntax*, pedagogic overture, 1921; *Toccata*, violin and pianoforte, 1921-22; *Bucolic Comedies*, voice and pianoforte, 1924; *Portsmouth Point*, overture, 1925 (performed at Zürich Festival, 1926); *Siesta* for church orchestra, 1926.

Walton-le-Dale, an urban dist. of N.E. Lancashire, England, on the Ribble; has cotton mills, corn mills, and iron foundries. The Unicorn Inn was Cromwell's headquarters in 1648. Pop. (1931) 12,700.

Walton-on-Thames, an urban dist. and tn. of Surrey, England; a favourite resort for boating and angling. Pop. (1931) 18,000.

Walton-on-the-Naze, or **Walton-le-Soken**, an urban dist. and par. of N.E. Essex, England, 7 m. S. of Harwich; is a favourite watering-place. It is chiefly modern, the anct. church and village having been engulfed by the sea. Pop. (1931) 3100.

Waltz, a dance, introduced on the Continent early in the nineteenth century, for any number of separate couples. The music is in three-four time and the motion is a gliding and revolving one. Among the most popular composers of Ws. are the two Strausses. The Ws. composed by Chopin and Liszt are of quite a different order, and are not intended for use as dance music.

Wampum, the shell beads used by the N. American Indians for dress ornamentation, for symbolic belts exchanged in inter-tribal treaties, and as a regular currency between them and the early colonists.

Wandering Jew, *The*, see **JEW**, **THE WANDERING**.

Wandsworth, a metropolitan and parliamentary bor. and parish in the co. of London, England. It is the largest of the metropolitan bors. (9108 acs.) and includes the parishes of Putney, Clapham, Streatham, Balham, and Tooting. The industries include oil-mills, dye-works, paper-mills, calico-printing, and breweries. Pop. (1931) 353,100.

Wanganui: (1) A tn. and port, North Is., New Zealand, on the Wanganui R., 134 m. N. of Wellington by rail; has refrigerating works and a collegiate school. Pop. 27,800. (2) A riv. of North Is., New Zealand, rises near Mt. Tongariro and discharges on the W. coast, 80 m. S.E. of New Plymouth. Length 120 m.

Wangaratta, a tn. of Victoria, Australia, 130 m. N.E. of Melbourne, at the junction of the Ovens and King Rs., and the cos. of Bogong,

Delatite, and Moira; is the centre of an agricultural and fruit-growing dist. Pop. 4100.

Wanks, *see* Coco.

Wanstead, an urban dist. of Essex, England. Pop. (1931) 19,200.

Wantage, a market tn. of Berkshire, Eng. It is famous as the birthplace of Alfred the Great (849), to whom a statue, by Count Gleichen, was erected in 1877. Bishop Butler (1692-1752), author of *The Analogy of Religion*, was a native. Pop. (1931) 12,000.

Wapakoneta, a tn. and co. seat of Anglaize co., Ohio, U.S.A., 12 m. S. by W. of Lima; is the centre of an agricultural and manufacturing (furniture, hollow-ware, and chains) dist. Oil and natural gas are found. Other manufs. are acetylene gas generators, refrigerators, wood-working machinery, and wheels. Pop. (1930) 5378.

Wapenshaw (A.-S. *waepen*, weapon; *scæwtian*, to show), in Scots feudal history, an exhibition of arms, according to the rank of the individual, made formerly at certain times in every dist. Such exhibitions or meetings were not designed for military exercises, but with the object of showing that the lieges were properly provided with arms. The name is sometimes used now to denote the periodical meetings of volunteer corps.

Wapiti, or *Cervus canadensis*, a large and magnificent deer once widely distributed throughout N. America, now limited to the Rockies and the Cascades. The bull stands from 4-5 ft. at the shoulder, and the antlers are large and finely developed.

Wapping, a dist. of London, on the N. bank of the Thames, in the metropolitan bor. of Stepney. The London Docks are here.

War, Department of, an executive department of the U.S.A. Gov. first created by Act of Congress, 1789. The War Secretary at its head is a member of the cabinet and since 1890 has had an assistant-secretary. The department is divided into a number of bureaus, each of which has a chief. The Secretary of War has charge of all military matters, the distribution of stores, and the care of harbours.

War and Warfare, *see* AERIAL WARFARE; AIR RAIDS; ARMS; ARTILLERY; BELLIGERENT; BELLIGERENTS, RIGHTS AND DUTIES OF; CAVALRY; CHEMICAL WARFARE; GUN; NAVAL MANŒUVRES; STRATEGY AND TACTICS; TANKS; TORPEDOES; SUBMARINE, etc. Various wars and historic battles are treated in separate articles. *See also* WAR, THE GREAT.

Warasdin, *see* VARASDIN.

'Waratab,' the name of a steamship of the Blue Anchor Line, bound from

Australia to London, which was believed to have foundered between Port Natal and Cape Town. The *W.* was last sighted at 9.30 a.m. on July 27, 1909. No certain trace of the vessel has since been discovered. About 300 lives were lost. Various theories have been put forward to explain the loss of the *W.* One unproved theory is that the vessel caught fire and exploded. The Board of Trade Report was pub. Feb. 22, 1911, and the Wreck Commissioners' Court, delivering judgment on the inquiry, inclined to the belief that the vessel capsized in a storm.

Warbeck, Perkin (1474-99), a pretender to the Eng. throne in the reign of Henry VII. He was a native of Tournay, and appeared in 1490 at the Burgundian court in the character of the younger of the two princes whom Richard III. was held to have murdered in the Tower. Here he was made welcome by his 'aunt' (the Duchess of Burgundy). He was received in England and also at the court of the Fr. king. Going to Scotland, he was received by James IV. and given Catherine Gordon as a wife. In 1498 he invaded the S.W. of England, besieged Exeter, but was captured and brought to the Tower. In the following year he escaped, but was recaptured and executed.

Warblers, or *Sylviidae*, a family of passerine birds distinguished from the thrushes by their more delicate structure and more subulate bill. They include some of the choicest songsters. Among the numerous British *Ws.* are the nightingale (*Daulias luscina*), robin (*Erithacus rubecula*), chaff-chaff (*Phylloscopus collybita*), gold-crested wren (*Regulus cristatus*), and the hedge sparrow (*Accentor modularis*). The birds popularly called *Ws.* include the garden *W.* (*Sylvia salicaria*), the grasshopper *W.* (*Acrocephalus navius*), the Dartford *W.* (*Melizophilus undatus*), the reed *W.* (*A. streperus*), and the sedge *W.* (*A. phragmitis*). These are all birds of unpretentious appearance, but many of the foreign species are more gaily coloured.

Warburton, Bartholomew Elliott George, usually known as Eliot Warburton (1810-52), an Irish author, b. at Aghrim, co. Galway. He was called to the Bar (1837), but spent most of his time in travelling. He perished in the burning of the *Amazon* on his way to Panama. He pub. *The Crescent and the Cross*, 1844; *Memoirs of Prince Rupert*, 1849; and *Darien, or the Merchant Prince*, 1851.

Warburton, Sir Robert (1842-99), a British soldier, b. in Afghanistan. He took part in the Abyssinian War (1867-68) and in the Afghan War.

From 1879-97 he was warden of the Khyber Pass. He served with the Tirah expedition (1897-98). He wrote *Eighteen Years in the Khyber*, 1900.

Warburton, William (1698-1779), an Eng. author and divine, was b. at Newark and educated at the grammar school there. He materially assisted Theobald in his edition of Shakespeare (1733), and this work owes much of its excellence to the advice of W. In 1759 he was made Bishop of Gloucester.

War Compensation Court, instituted under the Indemnity Act of 1920 to take over the functions of the Royal Commission appointed during the Great War to consider claims for losses arising out of requisitions or other forms of official interference with the normal course of private business concerns. The commission was constituted under a Royal Warrant dated March 31, 1915, and comprised members of parliament, together with representatives of agriculture, industry, and the legal profession. The members of the commission, which was dissolved in Aug. 1920, were transferred to the W. O. C., which thereafter adjudicated on claims as defined by the Act.

War Control, see CONTROL, ALLIED; FOOD CONTROL, BRITISH, IN WAR TIME.

Ward, in Eng. law, a minor who has been legally placed under the care of a guardian (q.v.). W. is also used for a subdivision of a city for civic purposes.

Ward, Artemus, see BROWNE, CHARLES FARRAR.

Ward, Genevieve, Dame (Countess de Guerbel) (1837-1922), Americo-British actress; b. March 27, in New York; daughter of Col. Samuel W., of Texas. Childhood spent in France and Italy. Her marriage with a Russian Count was annulled. Appeared in opera at Milan, 1856. Sang in Paris, London, U.S.A., Cuba. Voice injured by over-exertion; took to speaking-drama: first appearance, Manchester, 1873. Acted with Sir Henry Irving; toured Eng.-speaking world. Retired, 1888, but returned during War—played at St. James's, 1917. D.B.E., 1921. Died at Hampstead, Aug. 18.

Ward, James (1843-1925), Eng. psychologist; b. Jan. 27, at Hull; son of James W., of Liverpool. Educated: Liverpool Institute. Articled to architects; afterwards attended Spring Hill College for Congregational ministry. Pastor, Emmanuel Church, Cambridge, one year. Attended universities of Berlin and Göttingen; Trinity College, Cambridge; London University—M.A., 1874. Fellow of Trinity, 1874.

Sc.D., Camb., 1887. Professor of Mental Philosophy, Cambridge, from 1897. Stood for 'a spiritualistic monism.' Wrote: *Naturalism and Agnosticism*, 1899; *The Realm of Ends, or Pluralism and Theism*, 1911; *Heredity and Memory*, 1913; *Psychological Principles*, 1918; *A Study of Kant*, 1922. Died March 4.

Ward, John Quincy Adams (1830-1910), an American sculptor, b. at Urbano, Ohio. From 1850 to 1856 he studied under H. K. Brown, assisting him with the equestrian statue of Washington in Union Square, New York. In 1861 he opened a studio in New York City. In 1863 his 'Indian Hunter' was erected in Central Park, where also are his 'Freedman' and 'Shakespeare.' He executed the colossal statue of Washington for the Treasury Buildings.

Ward, Mary Augusta (Mrs. Humphry Ward) (1851-1920), British novelist; b. June 11, at Hobart, Tasmania; eldest daughter of Thomas Arnold, son of Dr. Arnold, of Rugby. Came to 'old country,' 1856; attended boarding schools; settled at Oxford, 1867. Mastered Spanish. Married, 1872, Thomas Humphry Ward, tutor of Brasenose. Removed to London, 1881; contributed (like her husband) to *The Times*. Fame rests mainly on *Robert Elsmere*, 1888, a narrative of religious crisis. Other works: *Miss Bretherton*, 1886; *David Griere*, 1892; *Marcella*, 1894; *Sir George Tressady*, 1896; *Marriage of William Ashe*, 1905; *Canadian Born*, 1910; *Delia Blanchflower*, 1914; *England's Effort*, 1916; *Towards the Goal*, 1917; *A Writer's Recollections*, 1918; *Fields of Victory* (war book), 1919. Died in London, March 24. See S. Gwynn, *Mrs. Humphry Ward*, 1917; J. P. Trevelyan, *Life of Mrs. Humphry Ward*, 1923.

Ward, William George (1812-82), an Eng. Rom. Catholic theologian and philosopher, b. in London. He went to Oxford and soon fell under the influence of Newman, to whose views he had previously been opposed. He openly defended Newman's *Tract XC.*, 1841, and in 1844 clearly defined his views in *The Ideal of a Christian Church*. In 1845 he entered the Rom. Catholic Church and became professor at St. Edmund's College, Ware (1852-58). Edited *Dublin Review* under Manning.

War Debts, see DEBTS, INTER-ALLIED.

Warden, in England, an officer appointed for the naval or military protection of some particular dist. The W. of the Cinque Ports was created by William the Conqueror with extensive jurisdiction over the

adjacent coast land. The Ws. of the marches were appointed to protect the boundaries between England and Scotland or Wales.

Wardmote, in the city of London an annual court or meeting held in each ward of the city under the presidency of the alderman. Its powers, which formerly extended to matters concerning the watch, the police, etc., are now merely nominal. The common councillors of the city are elected at the W.

Wardroom, in old naval ships the room, placed immediately over the gunroom, where the lieutenants and other principal officers slept and messed. In a modern man-of-war it is a cabin for the accommodation of lieutenants and other officers of W. rank, including pursers, naval instructors, doctors, and engineers.

Wardship, in feudal times, an incident of tenure (*q.v.*) by knight service. This right gave the lord the guardianship in chivalry of the heirs (males under twenty-one and females under fourteen) of his tenants, and with such guardianship the right to the lands of the heir, without having to account for the profits, until the heir came of age. W. was abolished under the Commonwealth.

Ware: (1) An urban dist., Hertfordshire, England, on the Lea, 2 m. N.E. of Hertford, has malting and brick-making industries. The Great Bed of Ware, mentioned by Shakespeare, was formerly at Rye House. Pop. (1931) 6200. (2) A tn., Hampshire co., Massachusetts, U.S.A., on the Ware, 25 m. W. of Worcester; manufs. cotton and woollen goods, boots and shoes. Pop. (1930) 7400.

Wareham, a municipal bor. and market tn., Dorsetshire, England, on the Frome, near Poole Harbour, 15 m. E. of Dorchester; has the remains of a British earth-wall. Pop. (1931) 2100.

War Graves, see GRAVES, SOLDIERS'.

Warkworth, a small seaport of Northumberland, England, on the Coquet, 1 m. from the North Sea, 6 m. S.E. of Alnwick. The ruins of W. castle and W. hermitage (mentioned in Percy's *Reliques*) are near by. It has a fourteenth-century bridge over the Dee. There are salt and brick manufs. and fisheries. Coal and fire-clay are worked near Amble. Pop. 720.

Warlock, Peter (pen-name of Philip Heseltine) (1894-1931), Eng. musical composer and critic, b. Oct. 30. Studied under Colin Taylor at Eton and under Delius and Bernard van Dieren. He founded the *Sackbut* in 1920 and edited it for a year. Wrote on Delius, many of whose orchestral works he arranged for pianoforte. His songs, written under

his pen-name, are amongst the finest written in the past thirty years. Pub.: *An Old Song*; *The Curlew*; a song-cycle (a Carnegie award, 1923); *Folk-Song Preludes*; *Lillygay*; *Saudades*; *Peterisms*; *Candlelight* (nursery jingles); *Corpus Christi*; and numerous separate songs. Also (with Philip Wilson) edited 150 old English airs. Books: *F. Delius*, 1923; *The English Ayre*, 1926.

War Medal, British, issued in July 1919, to record the successful conclusion of the War. It is awarded to all officers and men of the British, Dominion, Colonial, and Indian Forces, members of women's formations enrolled for service with the Forces, and members of military hospitals and kindred organisations, who either entered a theatre of war on duty, or who left their places of residence and rendered approved service overseas (other than the waters dividing the different parts of the United Kingdom), between August 5, 1914, and November 11, 1918 inclusive. The medal is in silver for all except British subjects enrolled in native labour corps units, for whom the medal is cast in bronze. The riband has an orange centre, watered with stripes of white and black on each side and with borders of royal blue. A committee of representatives of the Royal Academy, Royal Society of British Sculptors, National Gallery, and Royal Mint was appointed to determine the best method of obtaining the most artistic and suitable design for the medal. It was decided to throw open the design to competition among prominent artists, and eventually fifty-one artists submitted designs. The winning design was that of William McMillan, a young Scottish sculptor, who also won the prize for the best design for the Victory Medal (*q.v.*).

Warming, see HEAT and HEATING.

Warminster, a tn. of Salisbury Plain (W.), Wiltshire, England, 8 m. S. of Trowbridge. It has an anct. chapel, an endowed grammar-school, and Rom. remains near by. The malting and corn trade flourishes. Longleat with its deer-park, seat of the Marquesses of Bath, is 5 m. S.E. Pop. (1931) 5300.

Warner, Charles Dudley (1829-1900), an American author, b. at Plainfield, Massachusetts. He practised law in Chicago for some years. Among his works are: *My Summer in a Garden*, *Backlog Studies*, *Being a Boy*, *Life of Washington Irving*, *Life of Captain John Smith*, *In the Levant*, etc. He collaborated with Mark Twain in *The Gilded Age*, and was co-editor of *Harper's Magazine*, to which he contributed papers on the

South, Mexico, and the Great West. He also edited a *Library of the World's Best Literature*.

Warnsdorf, a tn. (formed 1870) in the extreme N. of Bohemia, Czechoslovakia, on the Saxony frontier, 60 m. from Prague. Cotton and textile industries are important. Pop. about 21,100.

War Office, the headquarters of the British army, situated in Whitehall, London. It was originally in Pall Mall. The department, during the early years of the present century, was thoroughly overhauled and revised on the recommendation of a specially appointed committee over which Lord Esher presided. An Army Council was formed which consisted of the Secretary and Under-Secretary for War, together with the Financial Secretary and four military members (Chief of the Imperial General Staff, Adjutant-General to the Forces, Quarter-Master General to the Forces, and Master General of the Ordnance). Each of these four members has some special department of the military service to superintend; they are responsible directly to the Secretary of State for War, who is, of course, directly responsible to parliament. The Inspector-General of the Forces, who took the place of the obsolete commander-in-chief, carried out the plans of the Army Council and reported upon the efficiency of the men and the utility of the reforms, but this post has now been abolished, and the duties allocated to a director of military training, a director of fortifications and works, and other officials. The germ of the present W. O. is to be found in the appointment of a 'Clerk to the General' in Charles II.'s days. The expressions 'Secretary to the Forces' and 'Secretary to the Council of War' were also current and appear to have developed into the 'Secretary-at-War.' This official was in the nature of a private secretary to the commander-in-chief, but the office grew in importance and considerable administrative duties became attached to it. The W. O. has expanded with the improvements in military science and the staff has developed with the mechanisation of units, chemical warfare, and improvements in guns. From the earliest times the Board of Ordnance was quite distinct from the W. O., but in 1855 it was abolished and its functions merged into the W. O. The executive head of the W. O. is the Army Council, presided over by the Secretary of State for War (see STAFF, ARMY). See further under ARMY—Army Administration.

War Pensions, see PENSIONS, WAR.

Warrandice, in Scots law, the obligation by which a party conveying a subject or right is bound to indemnify the grantee, disponee, or receiver of the right, in case of eviction, or of real claims or burdens being made effectual against the subject, arising out of obligations or transactions antecedent to the date of the conveyance. W. is either *personal* or *real*. *Personal* W. is that by which the granter and his heirs are bound personally, and is either *general*, when interpreted by the rules of *implied warrandice*, or *special*, which again is divided into (a) *simple*, viz., that implied in donations, or (b) *from fact and deed*, viz., that implied in transactions, or (c) *absolute*, whereby the granter is liable for every defect in the right which he has granted. *Real* W. is that by which certain lands are made over eventually in security of the lands conveyed.

Warrant, an instrument authorising one to do something which otherwise he has no right to do. In Eng. a police W. is issued by a justice on a written and sworn information of an offence; it is addressed to the constables of his dist., specifies the offence, describes the person accused, and commands the police to arrest him and bring him before justices to answer the charge. It remains in force until executed, and if the criminal escapes into another dist. the W. can be 'backed' by indorsement of the justices of such dist., so as to be enforceable against the criminal in such dist. A general W. (i.e. one which purports to authorise the arrest of unnamed persons without previous evidence of their guilt or knowledge of their persons) to seize suspected persons and a general search W. empowering messengers to seize documents are alike illegal.

Warrant of Attorney, a written instrument executed by one person authorising another to confess judgment against him in an action for a certain named amount. It is often given by way of security by a prospective debtor and enables the creditor to obtain judgment against the debtor without the delay and expense of an action.

Warrant Officers. *Naval*.—The name applies to all officers in the British navy who hold rank by virtue not of commission but of warrant. Formerly there were many more W. O. than there are at the present time—officers whose work was continued ashore even after the vessel had been paid off forming the bulk of them. Many officers who now hold commissions were formerly of warrant rank. Cadets and midshipmen at the pre-

sent day hold their positions by warrant and not by commission.

Military.—In the British army *W. Os.* are intermediate between non-commissioned and commissioned rank. There are Class I and Class II *W. O.* Class I comprises regimental sergeant-majors, master gunners, bandmasters, corporal-majors of the Household Cavalry, and others; Class II, regimental quartermaster-sergeants, quartermaster-sergeants, quartermaster-corporal-majors, etc. Candidates for promotion to Class I for appointment as regimental sergeant-major, etc., must undergo a course of instruction at Aldershot in the physical training of recruits. Such promotions are made on the recommendations of commanding officers and normally from the rolls of *W. O.* Class II in the corps (regiment, in the case of cavalry) concerned. *See also* ARMY—*Pay and Promotion.*

Warranty. In Eng. law a *W.* within the meaning of the Sale of Goods Act, 1893, is an agreement with reference to goods which are the subject of a contract of sale, the breach of which gives a right to sue for damages, but not to reject the goods or treat the contract as repudiated. A representation made by the seller at the time of sale will only amount to a *W.* if made with that intention, and the test of such intention is to determine whether the seller purported to assert a fact of which the buyer was ignorant. If not, then there is no *W.* A general *W.* does not give a right to sue in respect of defects obvious to both parties, but in this respect it is to be observed that a purchaser is not bound to use extreme diligence in finding defects.

Warren: (1) The co. seat of Trumbull co., N.E. Ohio, on Mahoning R., 53 m. S.E. of Cleveland. Trumbull is the leading dairy co. of Ohio and is well known for its stock and good farm land. It produces maple sugar and syrup, and has manufs. of machinery, boilers, furniture, electric lamps and appliances, pottery, and steel, and iron and coal mines. Pop. (1930) 41,062. *See History of Trumbull County*, 1882, and by Upton, 1909. (2) The co. seat of Warren co., Pennsylvania, U.S.A., on the Conewango and Allegheny Rs., 49 m. E.S.E. of Erie. Oil and natural gas abound, iron-ore and petroleum are found. *W.* has oil refineries, iron and chemical works, foundries, silk, woollen, and flour mills, and manufs. furniture. It is named after the American patriot, Joseph W. Pop. (1930) 14,863. *See* Schenck and Rann, *History of Warren County, Pennsylvania*, 1887. (3) A tn. of Bristol co., Rhode Is., U.S.A.,

6½ m. from Fall R., Mass., on Narragansett Bay. It has a good harbour. Cottons, handkerchiefs, rubber flooring, arch supports, yarn, and cordage are among the manufs. Pop. (1930) 7974.

Warren, in popular language, an enclosure made for the breeding of rabbits. The enclosure is usually effected with wire netting, about 6 in. of which is turned flat on the ground inwards. If the grass is good, it will support about twenty rabbits per ac., but overcrowding soon causes heavy mortality. Furze and juniper are often grown in *Ws.* and impart a good flavour to the flesh. Sometimes cabbage and other crops are cultivated for food.

Warren, Sir Charles (1840–1927), British general; b. Feb. 7, at Bangor, N. Wales; second son of Major-general Sir Charles W. Educated: Bridgnorth; Cheltenham College; Sandhurst; R.M.A., Woolwich. Commissioned in Royal Engineers, 1857. Excavations, Palestine, 1867–70. Commissioner for settling boundary between Griqualand-W. and Orange Free State, 1876–77. Dealt with various insurrections in S. Africa—then, and as major-general after a spell in Egypt, 1882. Chief Commissioner, Metropolitan Police, 1886–88. K.C.B., 1888. Commanded at Straits Settlements, 1889–94. Lieutenant-general, 5th Div., S. African War, 1899–1900. Wrote on Jerusalem and S. Africa. Died at Weston-super-Mare, Jan. 21.

Warren, Gouverneur Kemble (1830–82), an American general, b. at Coldspring, New York. He was educated at West Point for the army, which he entered at the age of twenty. He took an active part in the campaign of the American Civil War, being early in the war gazetted as brigadier-general of the volunteer corps. He was an exceedingly brilliant general, but his extreme qualities led him into some positions which a safer man would not have entered. He fell under the suspicions of several generals and was finally relieved of his command by Sheridan, but was completely exonerated by the court of inquiry. He was promoted to the rank of brigadier-general in the regular army. As an engineer his survey work was extremely valuable.

Warren, Leicester, *see* DE TABLEY, JOHN BYRNE LEICESTER WARREN.

Warren, Samuel (1807–77), a Welsh lawyer and author, b. in Denbighshire. He became Q.C. (1851), recorder of Hull (1854–74), and was an M.P. for three years. He wrote first for *Blackwood's Magazine*, in which appeared his *Passages from the*

Diary of a Late Physician and Ten Thousand a Year, the latter scoring a great success. Other works are *Now and Then* and *The Lily and the Bee*.

Warren, Whitney, American architect; b. Jan. 29, 1863, in New York. Studied there and in Paris under Daumet and Girault. Returned to New York, 1894. Designed New York Yacht Club House, 1899. As member of Warren & Wetmore, collaborated in design of Grand Central Station, New York, completed 1913. Designed: many hotels, clubs, and other large buildings in New York and Toronto; Grand Trunk Station, Winnipeg; bronze gates of cathedral of St. John the Divine, New York. Many foreign honours.

Warrington (anc. *Walintune*), a mun. and parl. bor. of Lancashire, England, on the Mersey, 16 m. from Liverpool and Manchester. It is on the Manchester Ship Canal below the Latchford locks. There are iron, glass, cotton, leather, soap, beer, and chemical manufs. W. has a cruciform parish church, a town hall, and some old timbered houses. It was on the Rom. road from Chester. Pop. rural district (1931) 16,035.

Warrnambool, a seaport of Villiers co., Victoria, Australia, on Lady Bay, Pacific Ocean, 50 m. from Portland. There are salt-water baths, botanical gardens, a museum, a steeplechase course, and factories. It has a fine harbour, and a lighthouse on the N. shore of the bay. Much sandstone is quarried. Pop. 6700.

Warsaw, formerly the cap. of Poland, then the cap. of the Russian prov. of Poland, and now again the cap. of Poland. It is situated on the left bank of the Vistula, and lies about 695 m. S.W. of Leningrad. It is built in terraces which rise in tiers from the riv. The tn. itself is surrounded by suburbs, the most important of which is Praga, which stands on the r. b. of the riv., and is joined to the cap. by a bridge. It is the largest city of the Polish Republic, and its buildings are particularly fine; it has many churches, Catholic, Gk., and Lutheran. The castle is a splendid building, and contains various art treasures. W. is well garrisoned and strongly fortified, and played an important part in the struggle for independence. The university, at one time suppressed, now has over 200 professors and over 1000 students. Pop. 1,109,500.

Wars of the Roses, see **ROSES**, **WARS OF THE**.

Warsop, a tn. of Nottinghamshire, England, 5 m. from Mansfield, on the Meden. There are horse and cattle fairs. The tn. has a thirteenth-century church. Pop. (1931) 10,700.

Wart, an excrescence caused by excessive growth of the tissues of the papillæ of the skin. Little is known of the manner in which Ws. are formed, and they usually appear and disappear without any apparent cause, especially in the young. They are very vascular, and are covered with some thickness of scaly epidermis, which easily becomes rubbed off. In children, the best course is to leave them alone, as they cause little inconvenience, and ultimately disappear. In older people they should be treated, as there is always the possibility of their being the manifestation of a malignant growth. A variety of W., known as 'anatomic tubercle,' is occasionally found on the hands of those who handle the tissues of tuberculous subjects in dissections.

Wartie (Polish *Warta*), a riv. of Poland and Germany, rising in the Carpathians, about 35 m. from Cracow, flowing N.W. and W. past Posen to join the Oder at Küstrin. It is about 450 m. long, navigable from Kolo, and connected with the Vistula through the Netze and the Bromberg canal.

War, The Great. (Military operations are treated in detail under the various fronts or theatres of operations. Detailed accounts of European diplomacy and policy during and after the War will be found under **EUROPE**; while the effect of the War on the internal politics of the different nations is treated under the name of the nation concerned.) See also summary of heads under **GREAT WAR**, vol. 6. The following history of the Great War treats of it as a whole and, for greater convenience of reference, is dealt with under the divisions and subdivisions enumerated below.

(i.) **CAUSES**.—*Intense Nationalism—Industrial Unrest; Balance of Power—Secret Diplomacy; Ger. Militarism; Effect of the Agadir Incident; The Serajevo Murder.*

(ii.) **EVENTS IMMEDIATELY PRECEDING OUTBREAK OF WAR**.—*Diplomatic Exchanges; Mobilisations—Austrian Attack on Belgrade; British Obligations towards Belgium—Ger. Ultimatum to Belgium; Ger. Attack on Liège.*

(iii.) **FIGHTING ON THE WESTERN FRONT IN 1914**.—*Fall of Liège—Arrival of the B.E.F.; The Battle of Mons—The British Retreat; British Halt at Grand Morin R.; The Battle of the Marne—The Ger. Retreat; Trench Warfare and Stabilisation of the Front; Belgian Resistance and Ger. 'Frightfulness'; Fall of Antwerp—Belgians open the Yser Sluices;*

The Attack on Ypres—Gheluvelt; Net Results of the Campaign.

(iv.) THE EASTERN FRONT IN 1914.—*Russian Invasion of E. Prussia; Ger. Invasion of Russian Poland—Russian Advance into Galicia; The Struggle for Cracow; Ger. Attack on Warsaw.*

(v.) SERBIA IN 1914.—*Failure of Austrian Attack on Serbia.*

(vi.) SOVEREIGNTY OF THE SEAS.—*Ger. Seaborne Commerce Destroyed; Mines and Submarines; Battle of Coronel—Battle of Falkland Islands; Ger. Colonial Empire Conquered; Ger. Raids on British Coast; American Attitude towards British Blockade; Ger. Air Raids.*

(vii.) ALLIES AND THE NEAR EAST.—*Man-power and Economic Resources of Allies and of Central Empires; British Attacks in the Persian Gulf and in the Dardanelles; Italian Diplomacy; The Dardanelles and Gallipoli.*

(viii.) THE EASTERN THEATRE OF WAR IN 1915.—*Mackensen's Galician Drive; The Fall of Lemberg; Ger. Offensive in Poland; Russian Bureaucratic Incompetence; Russian Retreat—Ger. Blow at Vilna.*

(ix.) WESTERN FRONT IN 1915.—*Allies' Spring Offensive; Ger. Gas Attacks; The Munitions Question in Great Britain; Western Front in the Autumn of 1915.*

(x.) THE NEAR EAST IN 1915-16.—*Gallipoli and the Dardanelles; Allied Diplomacy and the Balkan States; Allied Expedition to Salonika and Ger. Invasion of Serbia; Evacuation of Gallipoli and its Repercussion in Mesopotamia; The Russian Campaign in the Caucasus; The Arab Revolt; The Policy of King Constantine; Rumania's Entry into the War and Campaign in Transylvania; Mackensen's Campaign in Rumania.*

(xi.) THE WESTERN FRONT IN 1916.—*General Position at the Beginning of the Year; The Munitions Question in Great Britain; The Cavell Case; The Recruiting Problem in Great Britain; Ger. Attack on Verdun; Battle of Verdun (first phase); Battle of Verdun (second phase); Battle of Verdun (third phase).*

(xii.) THE ITALIAN FRONT IN 1916.—*General Position at the Beginning of the Year; Austrian Trentino Offensive; Italian Counter-offensive; The Advance on Trieste and Capture of Gorizia.*

(xiii.) THE RUSSIAN FRONT IN 1916.—*Russian Advance on Pripet-Pruth Line; Austrian Retreat to the Carpathians.*

(xiv.) IRISH REBELLION—*BATTLE OF JUTLAND.—British Military Service Act; Irish Rebellion; Battle of Jutland; Death of Lord Kitchener.*

(xv.) WESTERN FRONT (JULY-NOVEMBER, 1916).—*Str Douglas Haig appointed British Commander-in-Chief; Allied Military Conference; Allied Economic Conference; The Battle of the Somme (1916); Fr. Attack at Verdun.*

(xvi.) COLLAPSE OF RUMANIA.—*Allied Advance into Serbia.*

(xvii.) MR. LLOYD GEORGE AS PRIME MINISTER.—*Criticism of the Gov.*

(xviii.) GER. PEACE NOTE.—*Political Situation in Russia.*

(xix.) INTERVENTION OF THE U.S.A.—*Effect of the British Blockade on American Trade; President Wilson's Policy; Effect of Ger. Submarine Campaign; The 'Lusitania'; Ger. Agents in America; American Note on Allies' Maritime Policy; Republican Party's Attitude; American Presidential Election; Diplomatic Relations between U.S.A. and Germany Severed; Message to Congress; Passing of Selective Service Act.*

(xx.) RUSSIA REVOLTS.—*Dawn of the Revolution; Kerensky becomes Prime Minister; Trotsky's Repudiation of the Allies; Brest-Litovsk; The Baltic or Border Provinces; The Ukraine and the Caucasus; Ger. Ultimatum to the Bolsheviki.*

(xxi.) POLITICAL CRISIS IN AUSTRIA-HUNGARY AND GERMANY.—*Ger. Dream of 'Mitteleuropa' Realised; Problem of Oppressed Nationalities in Austria-Hungary; Resignation of Bethmann-Hollweg as Ger. Chancellor; Majority Socialists in the Reichstag; Fall of Ger. Chancellor Michaelis; Effect of President Wilson's Insistence on the Principle of Self-Determination.*

(xxii.) FOOD PROBLEM IN GREAT BRITAIN.—*Food Ministry Created; Limitation of Food Prices.*

(xxiii.) WESTERN FRONT (JANUARY-APRIL, 1917).—*Ger. Retreat to Hindenburg Line; The Third Battle of Ypres.*

(xxiv.) NEAR EAST CAMPAIGNS (1917).—*Fall of Baghdad—British Advance from Sinai; General Allenby Appointed to Command in Egypt and Palestine; Fall of Jerusalem.*

(xxv.) THE BALKANS (1916-17).—*Revolt in Crete; Allied Landing at the Piræus; Albanian Independence Proclaimed; Abdication of King Constantine of Greece.*

(xxvi.) INTRIGUE IN WESTERN EUROPE (1917).—*Stockholm Conference; Clemenceau Becomes Premier of France.*

(xxvii.) ITALIAN FRONT (1917).—*Cadorna's Appeal for Allies' Assistance; Italian Defeat at Caporetto—British Expedition to Italy.*

(xxviii.) FORMATION OF ALLIED COUNCIL AT VERSAILLES.

(xxix.) BRITISH WAR ORGANISATION IN 1918.—*Allied Naval Council.*

(xxx.) GER. PREPARATIONS FOR SUPREME EFFORT.—*British Western Front Weakened; Ger. Military Plan and the Reichstag.*

(xxxi.) GER. OFFENSIVE OF THE SPRING OF 1918.—*Attack on British Fifth Army; Failure of Ger. Offensive N. of the Somme; Political Controversy in England over Extension of the British Line; General Gough and the Fifth Army; Results of the Ger. Offensive; Battle of the Lys.*

(xxxii.) AMERICAN ARMIES IN FRANCE.—*British Losses; Allied Premiers' Appeal to America.*

(xxxiii.) GER. ATTACK ON THE CHEMIN-DES-DAMES.—*Ger. Armies reach the Marne.*

(xxxiv.) BRITISH NAVAL RAIDS ON ZEEBRUGGE AND OSTEND.

(xxxv.) THE ITALIAN FRONT.—*Austrian Advance; Italian Counter-attack on the Piave.*

(xxxvi.) MARSHAL FOCH'S COUNTER-OFFENSIVE.—*Ger. Retreat Begins; American Attack on St. Mihiel Salient; British Advance through Flanders; Closing Battles on the Western Front.*

(xxxvii.) THE ALLIES' TRIUMPH.—*President Wilson's Terms to Germany; The Armistice with Germany.*

(xxxviii.) EVENTS IN RUSSIA (1918-1919).—*Bolshevik Relations with Germany; Allies' Relations with Russia; British Expedition to N. Russia; The Czechoslovak Armies in Siberia.*

(xxxix.) OPERATIONS IN THE CAUCASUS (1917-1918).

(xl.) TURKS DEFEATED IN MESOPOTAMIA AND PALESTINE.

(xli.) COLLAPSE OF BULGARIA.

(xlii.) DISINTEGRATION OF AUSTRIA-HUNGARY.—*Austrian Defeat on the Piave; Armistice with Austria-Hungary.*

(xliii.) PEACE TREATIES.

(xliv.) COST OF THE GREAT WAR.—*Estimated Cost of the Great War; Gov. Loans in England.*

(i.) CAUSES.—*Intense Nationalism—Industrial Unrest.*—In the early years of the twentieth century the countries of western Europe had reached a high degree of progress and prosperity. The great advances of scientific discovery had revolutionised industrial processes and brought great wealth to leading industrialists. There had been a corresponding improvement in the conditions of life of the wage-earners, though the parade of luxury by the rich laid the seeds of a resentment which was shown in strikes and occasional industrial unrest, and also in political action by the workers who now, with the increased

facilities for popular education and the general extension of the suffrage, began to take a larger part in the gov. of the various countries. Anarchism, which had been the most extreme form of this political action, aiming by revolution at 'liberty for all' and the overthrow of all gov., had, however, disappeared before the end of the nineteenth century, but the expression of what came to be known as 'class-consciousness' took a variety of forms: Socialism, Social Democracy, Syndicalism, most of which movements were international, having for their common object the combination of the workers of all countries against the 'capitalists.' These organisations might therefore have been expected to make it difficult for statesmen to involve the workers of one country in a 'capitalists' war' against the workers of another country, but the political organisation of the workers was becoming identified with their industrial organisation in trade unions, and the entirely material objects of these organisations in the shape of higher wages and better working conditions led directly to an intense nationalism which counteracted the political movements. Trade unionists of one country saw the prosperity of their own trades threatened by the activities of foreign traders, and were ready to support tariffs designed to limit foreign competition. Tariff barriers led to trade jealousies between different nationals, and, combined with inherent political jealousies, constituted a latent danger to European peace. A greater element of danger, however, lay in trade expansion and the struggle for privileges in newly developing 'backward countries,' such as the Balkans, Asia Minor, North Africa, and in rival efforts to secure 'the road to the East.'

Balance of Power—Secret Diplomacy.—Until the close of the nineteenth century Great Britain had successfully preserved her policy of 'splendid isolation'; but with the new century it appeared to British statesmen that the Balance of Power in Europe was no longer stable. Since 1870 Germany had rapidly grown in military and industrial importance, and her imperial ambitions were regarded as menacing by Lord Lansdowne, then Foreign Secretary, who first threw over the policy of isolation by concluding in 1902 the Anglo-Japanese Treaty (q.v.)—thereby relieving Great Britain of large naval commitments in the Pacific—and by negotiations with the Fr. Gov., leading to the 'En-

tente Cordiale' of 1903—a defensive arrangement at first rather than an alliance. This was followed by a number of secret agreements between different countries, on which rumour was rife. Suspicion of bad faith naturally followed this 'secret diplomacy,' and perhaps more than any other one factor these secret commitments endangered good international relationships. Many of these agreements arose from suspicion of the motives of the Ger. rulers. The Ger. Empire had been formed in 1870 by a confederation of all the Ger.-speaking states with the exception of Austria. This confederation was principally the creation of the great Prussian Chancellor, Bismarck, and the constitution he drew up secured the major share in the gov. of the new empire for Prussia and her rulers, the Hohenzollern dynasty. Supreme gov. was vested in the Imperial Chancellor appointed by the Emperor, and the Emperor himself was in supreme command of the army and navy and in control of foreign affairs. Parliamentary control was limited, and even in parliament a Prussian majority was assured, at least in the Upper House which alone could initiate legislation. When in 1890 the Emperor William II. compelled Bismarck to resign, there began a period of development of Ger. power more dangerous to European peace than Bismarck's own policy.

German Militarism.—Emphasis was laid by the new rulers of Germany on 'blood and iron' and other incidental aspects of Bismarck's creed, and the writings of Nietzsche, with his ideal of a 'superman' for whom power was the sole aim, in the attainment of which any means were justifiable, appealed to the Prussian *Junker* (the land-owning, military caste) as providing admirable watchwords for Ger. policy. (See also BERNHARDI.) The securing once for all of Germany's prestige was equally important to the great Ger. industrialists, for the efficient Ger. trade machine was built up on a none too stable system of credit. The great pacific mass of the Ger. people allowed themselves to be dragged by their Prussian rulers into the acceptance of a 'kultur' of 'Deutschland über Alles' which was not purely material but appealed to the Ger. romanticism. (Consult Nietzsche, *Thoughts out of Season*.) A surprising feature in Germany's pre-War political development was the complete collapse of Social Democracy. The Ger. people were not essentially 'militarist,' and, generally speaking, the masses of

Ger. people were an element on the side of peace. The most pacific were, however, uneasy over their country's economic future and predisposed to some great effort to obtain security, and in this they were led by the new class of industrial magnates, the Prussian squirearchy, and the army and navy chiefs, the three most potent elements in Germany on the eve of the War and all of them dominated by medieval ideals of conquest. The countervailing element should have been found in the party of social reform, but, in the result, this element did not redress the balance. The Social Democrats were for ever in conflict with the gov. and torn by party faction *inter se*. In spite of their numbers, the Social Democrats were politically powerless, for the Ger. Constitution gave them no means of making their influence a reality. The extreme Left, led by Karl Liebknecht (*q.v.*), advocated class war by non-parliamentary methods; the Left Centre, led by Kautsky, Ledebour, and Haase, adopted parliamentary methods but would not co-operate with non-Socialist elements; the Right Centre, under Scheidemann (*q.v.*), and the Revisionists, under Bernstein, discounted revolution and worked for gradual reform; while the extreme Right, the Imperial Socialists, were almost identified with the bourgeoisie. With the exception of Liebknecht's party, all these sections were nationalist in spirit, though they paid lip service to certain pacifist doctrines. Bebel, who was no pacifist, was one of the commanding figures in this strong nationalist tendency, which was an important consideration in international affairs. Equally significant from the international standpoint was the Ger. fear of the Russian menaces—the 'barbarians from the E.' In France the one great Socialist, Jaures (*q.v.*), made every effort to counteract these tendencies, but without success, and his murder just before the War was in the nature of an international calamity. Thus, these tendencies made it easy to rally the Ger. people for war long before war was inevitable, and it was clear to the student of politics that no more was required than a small measure of conciliation by the Ger. Gov. in a crisis to swing the great bulk of the Social Democrats to its side. The Emperor William, who was not so much the leader as the exponent of Prussian aims, laboured under the characteristic Prussian defects of narrow vision and tactlessness. Prussian policy involved an immense expenditure on the finest

military machine in the world, which in itself was provocative of its effective use at some time. The expanding pop. of a great empire must have producing grounds for its raw materials, 'a place in the sun,' outlets in colonial possessions for its surplus people. A colonial empire must be guarded by a powerful navy, and the navy, in process of expansion, was now an obvious threat to British sea-power. Ger. power must combine Central Europe into a formidable *bloc*, with an extension of influence into the Middle East, where oil-fields were of rapidly increasing importance. Such were some of the theories underlying Prussian policy as expounded by the Emperor; but his spectacular landing in Morocco in 1905 and proclamation of Germany's intention to take the Sultan under her protection was followed by the diplomatic defeat of Germany at the Algeiras (*q.v.*) Conference, when Germany found herself deserted by every Power save Austria-Hungary, even by Italy, the third member with them of the Triple Alliance (*q.v.*). Germany was more successful in 1908 in supporting Austria when, on the overthrow of the old régime in Turkey, Austria seized the Turkish provs. of Bosnia and Herzegovina which she had long administered. This action roused the apprehensions of Russia and Italy; but the Emperor William then made his famous speech on 'Germany's shining armour' being in support of Austria, and neither Russia nor Italy was in a position to take armed action; but Italy was still further alienated from her partners of the Triple Alliance. In 1911 a further and abortive attempt by the Emperor to assert Germany's power led to considerable weakening of his prestige with his own people, a fact which may have had its influence with him in making his decision for war in 1914. Again Morocco gave Germany the occasion for self-assertion. There had been a revolt in Fez, and the city had been occupied by Fr. troops. Germany saw her chance to acquire a Ger. sphere of influence in Morocco, and the Emperor dispatched the gunboat *Panther* to Agadir in W. Morocco. Britain then sent a warship to Agadir, and under international pressure Germany retired.

Effect of the Agadir Incident.—This incident caused resentment in Germany against France and Great Britain, and it may be said that from that date the war party in Germany was supreme. This fact was not, however, generally re-

cognised. In February of 1912 Lord Haldane (*q.v.*) visited Berlin on behalf of the British Gov. and discussed the whole international situation with the Emperor and his principal ministers. Afterwards, during the heat of war, this visit was grossly misrepresented, and it was suggested that he had been completely and readily imposed upon by the Gers. In later years it became evident that Lord Haldane realised the danger to peace from the aggressive war party in Germany, but advocated the avoidance by Great Britain of any provocative action, because any such action would have strengthened the war party against what he believed to be the pacific intentions of the Emperor and his ministers. We may assume that in 1914 the war party was in control of Ger. policy, awaiting a suitable opportunity for war; but that the Emperor probably did not realise the full implication of its attitude. Meanwhile, Austria-Hungary, an artificial state held together only by the Hapsburg dynasty, continued to exist as an empire by methods of suppression of the subject peoples, Czechs, Poles, Ruthenians, Croats, Serbs, and Slovaks, who owed no racial or traditional allegiance to their Ger. or Magyar rulers. It was necessary for Germany to dominate Austro-Hungarian policy if she were to realise her dream of a solid *bloc* of German influence through Central Europe towards the Middle East, which had been threatened by the successes of Serbia in the Balkan War. The aged Austrian Emperor, Francis Joseph, embittered by the military disasters and family sorrows which had attended his reign, was content to rest his tottering throne on the might of Ger. arms, and Austria would never have taken the steps which plunged Europe into war if she had not been assured of Ger. support.

The Serajevo Murder.—The actual occasion for war was in itself comparatively insignificant, as has often been the case in history. The Austrian Archduke Francis Ferdinand (*q.v.*), nephew and heir of the Emperor Francis Joseph, had been attending army manoeuvres in Bosnia, and suddenly announced his intention of inspecting the troops in the Bosnian cap. city of Serajevo. On Sunday, June 28, 1914, he arrived in Serajevo accompanied by his wife, the Duchess of Hohenberg. A great crowd filled the streets, but it was not there to greet the Archduke but to celebrate the day of Kossovo, the anniversary of the great battle in the fifteenth century

when Sultan Murad I. destroyed the old Serbian kingdom. Ever since then the Serbs had kept the anniversary as a day of mourning; but this year, since the Balkan War had restored the Serbian losses, it was to be kept as a fête. As the royal party drove slowly through the streets a package fell on the open hood of the Archduke's car. He pushed it off, and the bomb inside it exploded in front of the second car, slightly wounding two of his staff and several spectators. The man who had thrown the bomb was arrested. He was a compositor named Gabrinovitch from Herzegovina, but who had been living in Belgrade. After the reception at the Town Hall, the Archduke proposed to drive to the hospital to visit his wounded officers. About ten minutes to eleven, as the royal party again drove slowly along the Appel Quay, a young man fired three shots from a pistol at the Archduke's car. He was a Bosnian student named Prinzip who also had been living in Belgrade. Both the Archduke and his wife were struck by bullets. The Archduke died almost immediately. His wife died a few minutes later in the Gov. House. In a proclamation issued later in the day the Burgomaster attributed the crime to Serbia. But for some time the murders seemed likely to have little serious consequences. After a long trial both the principal assassins escaped the death penalty (*see also* SARAJEVO). The murdered Archduke appeared to have been forgotten except for political exploitation of the murders in the Austrian newspapers. But on July 5 a meeting took place at Potsdam, the result of which was that Germany promised to support Austria in whatever demands she might make upon the Serbian Gov. Russia alone of the Entente Powers had taken alarm at the possible international effect of the murders, and about this time a warning was sent by M. Sazonoff, the Russian Foreign Minister, to Vienna that any unreasonable demands by Austria upon Serbia could not leave Russia indifferent, for Russia traditionally filled the rôle of protector of the Slav races. But in spite of this warning, and in spite of the report of the official Austrian investigator that the complicity of Serbia in the crime was not proved, the Austrian Gov. presented a drastic ultimatum to Serbia on July 23, requesting a reply within forty-eight hours. On the advice of Russia, Serbia, on the 25th, agreed to all the de-

mands save two which clearly conflicted with her authority as a sovereign state. Serbia suggested that these two points should be referred to The Hague Tribunal. Austria-Hungary immediately informed Serbia that the reply was not satisfactory. The Austrian Minister and his staff left Belgrade, and Austria-Hungary mobilised her southern armies and moved them towards the Serbian border.

Consult *Collected Diplomatic Documents relating to the Outbreak of the European War*, including the *British White Book*, *French Yellow Book*, *Russian Orange Book*, *Belgian Grey Book*, *Serbian Blue Book*, *German White Book*, *Austro-Hungarian Red Book*, with documents pub. subsequently (H.M. Stationery Office); Bainville, Jaques, *Histoire de Deux Peuples*, *La France et l'Empire Allemand*; Bernhardt, General F. von, *Germany and the Next War*, 1912; Churchill, Winston S., *The World Crisis*, vol. i.; Grey of Fallodon, Viscount, *Twenty-five Years, 1892-1916*; Haldane, Viscount, *Before the War*; Loreburn, Earl, *How the War Came*.

(II.) EVENTS IMMEDIATELY PRECEDING OUTBREAK OF WAR.—*Diplomatic Exchanges*.—The week that followed the Austrian mobilisation was filled with frenzied diplomatic efforts to avert the widening of the area of conflict. The British Foreign Secretary, Sir Edward Grey (afterwards Viscount Grey of Fallodon), played the most distinguished part in attempts at mediation; M. Sazonoff, for Russia, also made representations at Vienna, but they were abruptly rebuffed. Sir Edward Grey approached France, Germany, and Italy with the suggestion that a conference should be held in London to consider a solution of the Serbo-Austrian differences. France and Italy agreed, but Germany refused to consider the proposal. The Ger. Emperor, who had been absent on a holiday cruise in Norwegian waters, returned to Berlin, and Germany then made diplomatic efforts to ensure the neutrality of Great Britain if war should spread among the European Powers. The Imperial Chancellor, Bethmann-Hollweg, explained to Sir Edward Goschen, the British Ambassador in Berlin, that in Germany's view the quarrel with Serbia was purely Austria's affair, and that Russia was not affected, but that Germany was anxious to co-operate with Britain in preventing war between the Great Powers. Meanwhile the advice which Germany was giving to Austria involved no concession on Austria's part to Russian views, and the

British Foreign Secretary, realising this, warned Prince Lichnowsky, the Ger. Ambassador in London, of the risks if Germany and then France became involved in the dispute.

Mobilisations—Austrian Attack on Belgrade.—On July 29 Russia mobilised her forces in the districts nearest to Austria. On the same day Austria began the bombardment of the Serbian cap., Belgrade; the Ger. High Sea Fleet was recalled from the Baltic; Belgium began to prepare her defences, and concentration of the British fleet began. Germany informed Russia that her partial mobilisation would compel Germany to mobilise, and this was represented by the inept Ger. Ambassador in St. Petersburg, Count Portalés, as an ultimatum meaning war. On the same evening the Emperor William and his advisers resolved to declare war on France and Russia; but before doing so they determined to make a further attempt to secure Great Britain's neutrality by offering an assurance to the British Ambassador in Berlin that, provided the neutrality of Great Britain was definite, the Ger. Gov. 'aimed at no territorial acquisitions at the expense of France should they prove victorious in any war that might ensue.' Sir Edward Goschen questioned the Imperial Chancellor about the Fr. colonies and Belgium, 'and he said that he was unable to give a similar undertaking in that respect . . . It depended upon the action of France what operations Germany might be forced to enter upon in Belgium, but *when the war was over*, Belgian integrity would be respected if she had not sided against Germany.' Sir Edward Grey rejected these terms, as he was bound to do, but still made one more attempt to avert the storm. He delayed advising the British Cabinet to take any step which might involve Britain in war, although M. Paul Cambon, the Fr. Ambassador in London, had reminded Sir Edward of his promise in 1912 to discuss the attitude of Britain towards France if European peace were likely to be broken. M. Cambon asked in effect for an assurance of British support for France, and Sir Edward agreed to consult the Cabinet. On the following morning, July 31, the British Cabinet decided that they could not bind themselves. The gov. was uncertain of the feeling in the country and opinion within the Cabinet was divided. On the same day news of the general Russian mobilisation reached Berlin, and Germany at midnight presented an ultimatum to Russia. At the same time Germany asked France for a notification by 1 p.m. the following day whether she

intended to remain neutral in the event of a Russo-Ger. war. It was essential to the Ger. plan of campaign to involve France at the earliest possible moment, on the confident assumption that one swift blow would crush France and so leave the whole weight of the Ger. armies free to meet the formidable but slow-moving 'Russian steam-roller.' Austrian temporising with Russia had given signs of upsetting Ger. war plans. Germany countered this by her ultimatum to Russia and her demands from France. War was now inevitable; but still the British Cabinet clung to hopes of peace and refused to commit themselves to support France, in spite of a suggestion made by M. Poincaré, the President of the Fr. Republic, in a telegram to King George, that the best hope of keeping the peace lay in asserting the reality of the Entente even to readiness to take the field side by side. In the week-end of Aug. 1 to 3, apprehension of war in Britain became intense and on account of certain developments in connection with Belgium there was manifested a strong general opinion in the country against the ignominy of a disgraceful neutrality.

British Obligations towards Belgium.—*Ger. Ultimatum to Belgium.*—We must consider what were British obligations towards Belgium if we are to understand the British position. In 1839 a treaty (see *QUINTUPLE TREATY*) was signed in London between Britain, France, Prussia, Austria, Russia, and Holland, under which Belgium was recognised as a perpetually neutral independent country. Her neutrality was to be guaranteed by the first five signatory Powers. During the Franco-Prussian War, Great Britain obtained pledges from both the combatants not to violate Belgian territory, and Belgian neutrality continued to be a matter of serious concern to successive British Govs. When war between Germany and France seemed imminent, Sir Edward Grey asked for renewed assurances from both Powers. France gave the required guarantee, but Germany's answer was evasive, and contained a suggestion that Belgium had already committed certain hostile acts against Germany. At the British Cabinet meeting on the Saturday morning it was decided to notify Germany that Britain could not ignore any threat to Belgian neutrality. On Sunday, Aug. 2, Germany committed her first act of war, when Ger. troops crossed the frontier into the Grand Duchy of Luxembourg and seized its railway system. This small state, situated at

the south-eastern corner of Belgium, was not only perpetually neutral but practically disarmed and her neutrality had been guaranteed by France and Germany. That Sunday saw Ger. movements elsewhere. Cavalry patrols crossed the border into Alsace as far as the village of Jonchery and skirmished with Fr. pickets. Ger. dragoons raided the Fr. village of Suarce and took prisoner nine Fr. peasants. Early on the Monday morning before the declaration of war there was a Ger. raid near Lunéville, and a fight between Fr. troops and Uhlans at Réméréville. Still France behaved with restraint and kept her troops six m. behind the frontier. The Ger. Gov. circulated stories of Fr. violation of Ger. territory in order to convince the Ger. people that they were surrounded by a 'ring of enemies,' that Germany was the victim and not the aggressor. Meanwhile on Sunday Germany presented her ultimatum to Belgium in which she made the claim that she had received definite information that the Fr. intended to march through Belgium and she must therefore herself demand a passage through Belgium in order to counter this Fr. move. The note went on to say that if Belgium would agree to allow passage to the Ger. armies and would preserve a benevolent neutrality Germany would undertake to evacuate Belgian territory at the end of the war and guarantee Belgian independence. Failing compliance Germany would reluctantly be compelled to treat Belgium as an enemy. With the news of the Ger. ultimatum to Belgium, a change took place in the attitude of the British Cabinet. A strong pacifist group began to lose ground, and its former leader, Mr. Lloyd George, was turned towards a war policy, largely on account of the threat to Belgium. At the Cabinet meeting on the Sunday morning, Aug. 2, Sir Edward Grey was authorised to assure France of British naval support if the Ger. fleet came through the North Sea or into the Eng. Channel to attack the Fr. coast. On Sunday evening the British Prime Minister, Mr. Asquith, issued orders for mobilisation and summoned the Army Council to meet on Monday morning. On Monday Germany declared war on France. Early that morning Belgium had sent her reply to the Ger. ultimatum, boldly rejecting the Ger. proposals, and stating her intention to resist any attack upon her rights. At the same time Albert, King of the Belgians, telegraphed an appeal to King George for the diplomatic intervention of Great Britain on

Belgium's behalf. At the British Cabinet meeting on that morning Mr. Winston Churchill, the First Lord of the Admiralty, announced that the British navy was ready for war, and Lord Haldane announced the mobilisation of the army. Lord Morley and Mr. John Burns, unable to accept Great Britain's entry into war, resigned, and ten other members endeavoured to form a peace group, but in the afternoon they yielded to the obvious national feeling evoked by Sir Edward Grey's statement of policy to the House of Commons. The Foreign Secretary made it clear that he had made every possible attempt at mediation and only when all his efforts had failed was he driven to war. Britain was bound to Belgium by treaty obligations which could not be ignored, and she was now committed to the defence of the Fr. coast with her navy, although not tied to France by any definite treaty. On the morning of Tuesday, Aug. 4, Sir Edward Grey advised Belgium to resist a Ger. invasion by force, and promised to join France and Russia in supporting her.

German Attack on Liège.—Early that morning the Ger. invasion had begun. The frontier had been crossed at Gemmenich, and during the day Visé was burned and the forts at Liège were fired on. The Ger. Minister in Brussels announced that Germany would force a passage through Belgium, which was equivalent to a declaration of war. That evening Sir Edward Goschen presented Britain's ultimatum to Germany, with a time limit which was to expire at midnight. The Chancellor, Bethmann-Hollweg, described the step taken by Great Britain as 'terrible to a degree,' and said he would hold Britain responsible for all the events that might result. 'Just for a scrap of paper Great Britain was going to make war on a nation who desired nothing better than to be friendly with her.' No formal reply was given; but late that evening the Ger. newspapers reported war with Britain. Feeling against Britain was the more bitter in Germany because the Ger. people had believed that Great Britain would remain neutral; but the Ger. leaders had only themselves to blame. Their plans had involved conflict with Britain in their own time, but they had hoped to settle with France and Russia first. At midnight on Tuesday, Aug. 4, 1914, a state of war automatically came into being between Germany and Great Britain. Austria-Hungary, which had precipitated the war from a mistaken attempt at self-defence against the growing

Slav power in the Balkans, had made a vain effort to withdraw when she foresaw the likelihood of a European war; but Germany had by that time taken charge, and from that time onwards the war resolved itself into a conflict between Ger. plans for world dominion and an association of nations determined to preserve their independence. In the predisposing causes of the War, as has been shown, mistakes were made on the Allied side; but, as to proximate causes, Prussian policy was mainly responsible. Germany may not have deliberately worked for war; but she worked for domination and, having made all preparations in case war broke out, blundered into it.

(iii.) FIGHTING ON THE WESTERN FRONT IN 1914.—*Fall of Liège.*—*Arrival of the B.E.F.*—The Ger. invasion of Belgium met with its first check when the Belgians, aided by the fortifications of Liège, held up the Gers. for two days in front of that city. Liège itself was entered on Aug. 7; but still the Gers. could not secure free progress, because some of the forts around the city held out under General Leman for another week until reduced by the Ger. heavy howitzers. During the following week Ger. troops overran half Belgium. The main Belgian army fell back towards Antwerp, leaving Brussels unprotected and the Gers. entered the cap. on the 20th and demanded a war indemnity from the city equivalent to eight million pounds. The fortress of Namur was now the last barrier between the Ger. advance and the northern frontier of France. But this fortress, which had been supposed to be impregnable, was soon reduced by the Ger. heavy artillery. The bombardment began on Aug. 20, and by the 23rd the city and most of the forts were captured, although two forts resisted until the 26th. The greater part of the Southern Belgian Army was destroyed in the fall of Namur, and this was the first conspicuous success achieved by the Gers. in the War. Meanwhile the Fr. High Command remained in ignorance of the real weight of the Ger. drive through Belgium. General Joffre, the Fr. Commander-in-Chief, did not believe that the Gers. could spare more than a limited number of troops for service in Belgium, and the Gers' cavalry screen in front of their Belgian advance served them well in obscuring the size of the great armies of von Klück and von Bülow which were overrunning the country. The Fr. miscalculated because they assumed that large Ger. forces must have been sent to the Eastern Front

against Russia, whereas Germany was gambling on crushing the Fr. by overwhelming numbers in six weeks, meanwhile holding the Russian front with a skeleton force. Acting on the Fr. theory that attack is the best defence, General Joffre directed offensives into Alsace and Lorraine on Aug. 10. Both failed, and neither proved any distraction either to the Ger. right wing advancing through Belgium or to the Ger. centre advancing by way of Luxembourg and the Ardennes. The Fr. had therefore made no effective plan to meet the threat of the Ger. advance through Belgium when the small British Expeditionary Force of some 150,000 men under Sir John French reached France. The first two corps of this force took their place on the left of the 5th Fr. Army in the neighbourhood of Mons on Aug. 22. The Commander of the 5th Fr. Army, General Lanrezac, was beginning to appreciate the weight of the Ger. forces on his front, but had not yet convinced the Fr. High Command. The transport of the British Expeditionary Force across the Channel had been completed in ten days, a remarkable feat of organisation. Although a small army relatively to the other forces engaged, the British force consisted of the most highly trained and experienced soldiers in Europe with the best equipment and the highest morale, and the Ger. gibe, attributed to the Emperor William, of 'this contemptible little army' (probably no more than an allusion to its numbers) justified itself only by contradiction in providing a characteristically Eng. description, 'The Old Contemptibles,' for the handful that was to perform the epic feat of saving Paris and possibly of saving the whole of the Fr. armies from disaster in the first few weeks of war. Some Fr. criticism was provoked by the strict instructions given by Lord Kitchener, who had been appointed Secretary for War, to Sir John French, to conserve his forces and not to engage the enemy unless adequately supported by the Fr.; but Lord Kitchener was the first military leader on either side to foresee the possibility of a long war (his estimate was three years at least), and he realised that Britain was not a 'nation in arms' in the Continental sense, but must depend for the training of her armies which would carry on the latter part of the War on this small nucleus of a highly trained professional force. The first two British corps of some 70,000 men came into contact with the Gers. on Sunday the 23rd. On the

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against Russia, whereas Germany was gambling on crushing the Fr. by overwhelming numbers in six weeks, meanwhile holding the Russian front with a skeleton force. Acting on the Fr. theory that attack is the best defence, General Joffre directed offensives into Alsace and Lorraine on Aug. 10. Both failed, and neither proved any distraction either to the Ger. right wing advancing through Belgium or to the Ger. centre advancing by way of Luxembourg and the Ardennes. The Fr. had therefore made no effective plan to meet the threat of the Ger. advance through Belgium when the small British Expeditionary Force of some 150,000 men under Sir John French reached France. The first two corps of this force took their place on the left of the 5th Fr. Army in the neighbourhood of Mons on Aug. 22. The Commander of the 5th Fr. Army, General Lanrezac, was beginning to appreciate the weight of the Ger. forces on his front, but had not yet convinced the Fr. High Command. The transport of the British Expeditionary Force across the Channel had been completed in ten days, a remarkable feat of organisation. Although a small army relatively to the other forces engaged, the British force consisted of the most highly trained and experienced soldiers in Europe with the best equipment and the highest morale, and the Ger. gibe, attributed to the Emperor William, of 'this contemptible little army' (probably no more than an allusion to its numbers) justified itself only by contradiction in providing a characteristically Eng. description, 'The Old Contemptibles,' for the handful that was to perform the epic feat of saving Paris and possibly of saving the whole of the Fr. armies from disaster in the first few weeks of war. Some Fr. criticism was provoked by the strict instructions given by Lord Kitchener, who had been appointed Secretary for War, to Sir John French, to conserve his forces and not to engage the enemy unless adequately supported by the Fr.; but Lord Kitchener was the first military leader on either side to foresee the possibility of a long war (his estimate was three years at least), and he realised that Britain was not a 'nation in arms' in the Continental sense, but must depend for the training of her armies which would carry on the latter part of the War on this small nucleus of a highly trained professional force. The first two British corps of some 70,000 men came into contact with the Gers. on Sunday the 23rd. On the

22nd and the 5th Fr. Army had been attacked at Charleroi and had fallen back in some confusion. A breach was thus made in the Fr. line, and on the same day the 3rd and 4th Fr. Armies further to the E. had also retreated, leaving the Gers. free to attack the British in force. Owing to the confusion, no information of these retreats reached Sir John French, who faced the enemy under the impression that his troops formed part of an unbroken line, whereas they were completely isolated and facing a Ger. force two or three times the size of the estimate supplied by the Fr. to the British when the latter took up their position.

The Battle of Mons—The British Retreat.—The Battle of Mons began with a bombardment from between five and six hundred Ger. guns, and the Gers. then advanced in mass formation, only to find that the shelling had had no effect on the morale of the British troops nor on the accuracy of their rifle-fire. The attack on the British front failed; but British success there could not avert the threat of von Bülow's attack on the British right flank and, when the delayed news of the Fr. withdrawal was received at British Headquarters, Sir John French ordered the evacuation first of Binche and then of Mons itself. The British retreat during the night was covered at dawn by a counter-attack by the First Division which suggested to the Gers. that the British had been reinforced and intended an offensive. The plan of the British Commander was to retreat to a line giving his troops the protection of the fortress of Maubeuge and the R. Sambre on the right; but the protection of the Sambre was useful only if the Fr. could hold the Meuse and von Klück could not outflank the British on their left. In fact von Klück had seized Tournai and the Meuse had been forced, and the three Fr. armies were in full retreat. If the British had stood to give battle on the line originally selected they would, as at Mons, have been liable to encirclement, and therefore Sir John French continued the retreat to Le Cateau. At nightfall on the 25th, the British troops reached a line through Maroilles, Landrecies, and Le Cateau to Serainvillers near Cambrai; but by 10 p.m. the Gers. were in Landrecies. In the fighting that ensued, the British troops showed capacity in taking the initiative. The Gers. were driven out by detachments of the Grenadier, Coldstream, and Irish Guards. At Maroilles too with some Fr. support the British drove out the Gers.; but at daybreak on the 26th

the Gers. delivered a more powerful attack on Le Cateau (*q.v.*). General Sir Horace Smith-Dorrien, commanding the British 2nd Corps, had been warned by Sir John French that a stand at Le Cateau involved too great a risk; but he thought that he had no option, and for seven or eight hours his men, reinforced by Snow's Division, but outnumbered in guns by nearly four to one, held their own until von Klück threatened another envelopment. Fortunately for the British the Gers. were exhausted by the battle. General Sordet's Fr. cavalry had crossed Smith-Dorrien's front to protect his left, and the remnants of the corps were thus enabled to retreat. During the retreat the British losses were heavy, and the 1st Gordons, losing their way in the dark, were all killed, wounded, or taken prisoners by the enemy; but the Battle of Le Cateau had held up the Gers., and at last the British were able to regain touch with the 5th Fr. Army to the E., with a new Fr. corps under d'Amade in the W., and also with another new Fr. army, the 6th, under General Maunoury (*q.v.*) on the Somme. On the evening of Friday, the 28th, Smith-Dorrien reached the R. Oise, and was at last reunited with Sir Douglas Haig's 1st Corps, which had marched through Guise, and had lost a detachment of the Munsters; but the loss had been redeemed by the defeat on the 28th of two Ger. columns by two brigades of General Allenby's cavalry, led by Gough and Chetwode. The British army was at last able to rest. By the remarkable endurance of the British troops much had been saved besides the British army itself. But many men, much material, and a considerable area of country had been lost. The Fr. frontier S. and W. of Mons contained no modern fortification except the fortress of Maubeuge, which was gallantly defended by General Fournier and his garrison and held out against an eight days' bombardment by the whole of the siege-train from Namur—a resistance which hampered the Ger. communications and held up a considerable number of their troops. To the W. Ger. cavalry now swept across Belgium as far as the R. Lys and down towards Lille and Arras, with the object of cutting communications between the British army and its bases at Boulogne and Dieppe. So serious did the position appear to Sir John French that he moved his base as far S. as St. Nazaire, at the mouth of the Loire, and it required a personal visit from Lord Kitchener to prevent him withdrawing the Expeditionary Force from the line for a

complete refit. The Channel ports as far as the Seine lay open to the Gers.; but they had other plans. They were intent on destroying the Fr. armies by a series of hammer blows and hoped to dictate peace on their own terms before autumn. So far they had made rapid progress towards this object. The fall of Namur, the defeat of Lanrezac's 5th Army at Charleroi, the Battle of Mons, and the defeat of the Fr. on the R. Semois had been followed by the rout of Ruffey's and Langle's armies on the Meuse. These 3rd and 4th armies had stretched from Montmédy by Sedan towards Dinant; but on Aug. 27, following the fall of Namur, von Hausen's 3rd Ger. Army drove in the Fr. left wing, while the Duke of Württemberg and the Ger. Crown Prince attacked all along the front. Ruffey had to withdraw to the Argonne, and Langle fell back on the Aisne. Near Guise on the 29th Lanrezac's 5th Army inflicted the most serious check the Gers. received, but with no adequate support he too had to fall back again. On the 28th and 29th the Gers. forced the crossing of the Aisne and Rheims and Châlons were abandoned. On the 30th, La Fère and Laon were also evacuated. The British retreat continued through the forests of Villers-Cotterets and Compiègne towards the R. Marne. On Sept. 1 at Néry a gallant cavalry charge by the 1st Brigade saved the guns of a battery of the Royal Horse Artillery which had been almost wiped out, and on the same day a vigorous rearguard action was fought by the 4th Guards Brigade.

British Halt at Grand Morin R.—On Sept. 3 the British reached the line of the Marne, but abandoned it further E. without resistance, and on the 5th the Expeditionary Force was concentrated behind the Grand Morin R. due E. of Paris and close to the city. The successful conduct of the retreat by the British force to this point was a considerable feat, and the Fr. armies, with heavier losses and less complete preparation than the British, had also shown steadiness under adversity. With the near approach of the enemy to Paris general opinion in the Allied countries tended to assume that the capture of the city was the main object of the Gers., but Napoleon's maxim still held good that fortresses are captured on the field of battle. No city could be captured and held with an unbeaten army still in the neighbourhood, and no fortifications could survive bombardment by modern heavy guns when isolated from a mobile army. Thus there could have been no sur-

prise when von Klück's right wing began to veer away from Paris towards the S.E. His object throughout was to outflank the Allied left, and to avoid the obstacle of Paris until he had accomplished his main purpose. Still there was no certainty that the Marne could be held, and the Fr. Gov. took the wise but rather alarming step of retiring to Bordeaux. The position of the British army and the threat to Paris perhaps gave to contemporary British observers undue importance to von Klück's movements, and it is probable that the Ger. attack on the Fr. right in Lorraine was intended as a major operation, because the Kaiser himself was present at the attacks on Lunéville and Nancy. Lunéville was occupied on the 22nd after the failure of the Fr. offensive on the Saar, and on the 23rd fighting began for the Grand Couronné de Nancy; but although the fiercest attack in the area was still to come the Ger. advance had been decisively checked at Mirecourt before Joffre decided to give battle on the line of the Marne. The Fr. could feel secure on their right flank for the time being, for they were now in touch with their reserves, while the speed of the Ger. advance was slackened, and reserves which the Gers. might have used to relieve the troops investing Mauberge had been diverted to meet the Russian invasion of E. Prussia. Undoubtedly Joffre chose the right moment to attack, when he decided on an offensive on Sept. 4. Two new armies of reserves had been brought into the line, Foch's 9th Army and Maunoury's 6th, and two old armies had new commanders, Sarrail replacing Ruffey and Franchet d'Esperey replacing Lanrezac. To the E. Castelnau and Sarrail stood almost back to back along the eastern and western heights of the Meuse above Verdun. On Sarrail's left was Langle's 4th Army behind Vitry-le-François; and the line was continued westward by Foch's army on the St. Gond marshes, that of Franchet d'Esperey was linked by cavalry to the British, who were guarded by the Crécy forests, and on the British left, stretching north-westward across the Paris front, was Maunoury's new 6th Army. Von Klück erroneously believed he had practically disposed of the British at Le Cateau and of Maunoury on the Somme, and that the 5th Fr. Army had thus become the left wing of the Allies. By the night of Sept. 5 he had crossed the Marne, the Petit Morin, and the Grand Morin and his patrols had reached the Seine.

The Battle of the Marne—The Ger. Retreat.—On Sunday, Sept. 6, the First

Battle of the Marne began. It reached its climax on the 9th and was over by the 12th. The fighting extended from Meaux, almost on the outskirts of Paris, to Lunéville, almost on the Ger. frontier. Von Klück, still acting on his mistaken assumption, invited disaster by marching across the front of the western armies, which moved out to attack his flank. Maunoury advanced from Meaux and began fighting his way to the Ourcq, while the British emerged from the Crécy forests and drove the enemy back to the Grand Morin. D'Esperey made headway against the bulk of von Klück's army, while Foch held his own against von Bülow and von Hausen's right, and Langle against the Duke of Württemberg. Sarraill's 3rd Army had, however, to yield ground along the Meuse. On the following day the British drove the Gers. across the Grand Morin at Coulommiers and thus enabled D'Esperey to repel von Klück's centre. On the 8th, however, Maunoury was hard pressed by von Klück's desperate efforts to deal with this sudden danger; but reinforcements were rushed from Paris, and the British won the Petit Morin, while D'Esperey was victorious further E. and captured Montmirail. By 11 a.m. on the 9th von Klück's Army was ordered to retreat, thus exposing von Bülow's right and giving Foch his opportunity for the decisive stroke of the battle. Maunoury's counter-attack on the left had compelled the Gers. to weaken their centre, and a gap had been left between von Bülow's left and von Hausen's right, while von Bülow's position was still further complicated by the fact that his centre was fixed in the St. Gond marshes. Foch struck at von Bülow's centre, right and left, and by the morning of the 10th he had broken the most important part of the Ger. front. Meanwhile Maunoury had driven the Gers. from the Ourcq on the 9th, and on the same day the British had crossed the Marne at Changis and reached Châteaui-Thierry, while D'Esperey had reached the riv. further E. The reinforcements for von Klück were those intended for von Bülow, and the latter's retreat made them useless to von Klück. The Ger. retreat became general on the 10th, and by the end of the week the Gers. were driven back to a line running from the Oise beyond Compiègne to the Aisne, along that riv. to Berry-au-Bac, and across Champagne and the Argonne to Verdun. In Lorraine, also, Castelnau took the offensive and drove the Gers. back from Nancy to beyond the Meurthe, and out of Lunéville and

St. Dié. The Ger. right had fallen back thirty-five m. and the centre nearly fifty; but their losses had been small. The battle was important because it frustrated the Ger. plan to destroy the Fr. armies, and so made certain a long war in which increasing advantage was to be on the side of the Allies. The retreat of the Gers. from the Marne had taken them across the Aisne, and the Allies followed up their advantage on Sept. 13 by attacking the Ger. positions along the line of the Aisne. To the Fr. High Command, as indeed to all observers, it seemed that the Gers. were now fighting rearguard actions in the course of a full retreat. The Battle of the Aisne (*q.v.*) was the first indication that the War was not to be an affair of outflanking movements leading to speedy victory of one or other side, but a prolonged struggle for supremacy on the same ground, in which soon neither side had flanks to turn, because both flanks were to be forced outwards until one lay on the sea and the other on the borders of Switzerland. The Battle of the Aisne (*q.v.*) began on Sept. 13. Both the British and Fr. crossed the riv. at several points, but were unable to dislodge the Gers. from the high land beyond. On the 15th the Gers. counter-attacked, driving back the British from Vregny, and General Maunoury's troops from Nouvron and Autréches. There was a lull on the 16th, and on the 17th Maunoury recovered the quarries of Autréches; but E. of Rheims the Fr. had fallen back. On the 18th Maunoury had a further success on the Oise. This led Joffre to alter his plan. The Gers. had the advantage in position, and Joffre accordingly extended his left by the creation of two new armies holding a line as far as Arras and Lens. At the same time the Gers. attempted to get behind the Fr. right in the Verdun area, but only succeeded in establishing a large salient which they were destined to hold for four years. The Ger. Crown Prince, having failed to break through here, met with a more severe reverse further W., where his troops in attacking Sarraill's centre were so strongly resisted that they temporarily lost Varennes and the main road through the Argonne to Verdun.

Trench Warfare and Stabilisation of the Front.—The lines began now to be stabilised between Rheims and the Alps, and both sides settled down to trench warfare, an almost entirely new method in which all old theories of war were discarded. Between Rheims and the sea the month of Oct. was spent in a struggle to determine where that part of the line

would become stabilised. The Gers. moved great masses of their best troops to the western area, because they now realised that the British army was to prove an increasingly formidable opponent. Falkenhayn (*q.v.*) superseded von Moltke as Chief of the Imperial General Staff. Before the end of Sept. Sir John French concluded that the British army was out of place in its present position, where the trenches could be held by Fr. territorial troops, and that it should be in Flanders close to its bases to meet the new Ger. threat to the Channel ports (*q.v.*). Joffre agreed to his suggestion, and called up the 8th Fr. Army to support the transfer, which began on Oct. 3 and was efficiently accomplished. During the fortnight of the British transfer, the Fr. had to bear heavy attacks in the W., with varying success. The struggle, which had begun as attempts at outflanking movements on both sides, soon developed into a race to reach the coast so as to establish the final position at as favourable a point as possible.

Belgian Resistance and Ger. 'Frightfulness.'—The Allies hoped to be able to make a connection with the Belgian army in Antwerp, which all this time had kept the Gers. occupied with vigorous raids. The Gers. hoped to push their right as far as the Seine. A British Naval Division was landed at Antwerp to help the Belgian army, and for a time it seemed that the Allies would be successful in joining up with the Belgians; but success was missed because it had been more essential to break the Ger. attack on the Marne than to keep in touch with the Belgians. Three sorties by the Belgians from Antwerp had helped the general Allied position. On Aug. 24 they captured Malines, and 2000 British marines were landed at Ostend, with whom the Belgians tried to establish contact by attacking and capturing Alost. At the same time they attacked the line between Brussels and Louvain, and threatened the Ger. communications, forcing the Gers. to recall at least three corps from France. The Belgian successes so seriously interfered with the Ger. plans that the Gers. were provoked to vigorous methods, characterised in the Allied Press as 'frightfulness' in order to overawe the Belgians, a logical if ill-calculated extension of Prussian military theory, for the only effect of these methods was to stiffen the Belgian resistance. Among these measures was the systematic destruction of Louvain, with its anct. university and library; the bom-

bardment of the Cathedral and Palais de Justice at Malines and the burning of Termonde because a fine was not paid in time. Some of these excesses were no doubt the natural result of the Prussian military system, the revolt of an over-disciplined soldiery; but others were part of a more deliberate plan of war, and necessarily aroused the reprobation of the civilised world, while sympathy, even among previously pro-Ger. elements, was much strengthened by the dignified protests of Cardinal Mercier (*q.v.*), Archbishop of Malines, and Burgomaster Max of Brussels. A further sortie took place from Antwerp on Sept. 9. Termonde and Aerschot were captured, and Kessel, just outside Louvain, was taken on the 10th; but Ger. reinforcements arrived on the 11th, and the Belgians were driven back, with renewed Ger. violence in their wake. Further fighting took place on Sept. 26 and 27; but by this time Antwerp was assuming greater importance in the eyes of the Gers. as a possible threat to England, and also as a 'fine city to ransom,' and on Sept. 28 they began to besiege it.

Fall of Antwerp—Belgians open the Iser Sluices.—The ring of forts round Antwerp failed to hold up the Gers. because of inequality in artillery power, and by Oct. 1 the reservoir which supplied the city with water had been destroyed, flooding the Belgian trenches on the S. of the city. The Belgian Gov. decided to leave Antwerp on Oct. 1, but its departure and the flight of civilians were postponed on account of the arrival of Mr. Winston Churchill, the British First Lord of the Admiralty, with a brigade of Royal Marines and later two naval brigades. These troops were at once sent to help the Belgians in the trenches, but on Oct. 5 the defences were overcome and the Gers. began to use their howitzers on the city ramparts. On the 7th the evacuation of the city began by land and sea. The Belgian and British troops tried to hold up the Gers. while the inhabitants fled, and the Gers. tried to cut off retreat by advancing up the Scheldt; but the greater part of the Belgian army made its way towards Zeebrugge and Ostend with the remnant of the British force, which suffered very heavy losses. Some of the inhabitants were forced to cross the frontier into Holland, where they were interned. On the 10th the Gers. entered the almost deserted city. The expedition of the British Naval Division had been a failure; but at the time of its dispatch it had been hoped to effect the larger plan of linking together the main British

army and the Belgian army. The fall of Antwerp, however, finally disposed of this plan. In fixing the lines along which the opposing armies were to remain, with small fluctuations, for four years, the British navy played an important part, for the guns of three shallow-draught monitors from the 18th to the 28th Oct. swept the Belgian coast for 6 m. inland and held up the Ger. advance on Nieuport. But still more decisive in stopping the Ger. advance was the action taken by the Belgians, in imitation of their ancestors' tactics against the Spanish, when they opened the sluices of the Yser at Dixmude and allowed the water to flood the country over which the Gers. were advancing. Men were drowned and guns lost in the floods, and presently the Belgians on the line from Nieuport to Dixmude were protected by an impassable sheet of water. The Gers. succeeded in capturing Dixmude on the eastern bank of the Yser, but they were unable to cross the riv. Meanwhile a great battle had been waged around Arras, where the Gers. tried to break through in the hope of isolating the British. Although the tn. was reduced to ruins, the Fr. finally drove back the Gers. on the 26th.

The Attack on Ypres—Gheluvelt.—At the same time a prolonged and confused battle was raging round Ypres during which Indian troops first distinguished themselves at Neuve Chapelle where they were assisting Smith-Dorrien's tried and depleted corps. The final attack on Ypres itself began on the 21st. The British 7th Division sustained the brunt of the attack, but Haig's 1st Corps could not counter-attack, because he was compelled to detach supports to the S.E., where long sections of the line were held only by cavalry. The crisis of the battle came on Oct. 31, the Kaiser having arrived on the 30th. The main Ger. attack was on Gheluvelt, and the 1st Division was thrust back into the woods in front of Hooze. The flank of the 7th Division was exposed and the Royal Scots Fusiliers were wiped out. Mousv's arrival with part of the 9th Fr. Corps averted disaster, although he had to embody regimental cooks and other unarmed men to help to hold the line. But in the early afternoon a charge by the 2nd Worcesters drove the Gers. out of Gheluvelt and relieved the pressure on the 7th Division, who were able to regain their positions. The Gers. made another attack on Nov. 1, capturing Hollebeke and Messines and, during the night, Wytschaete; but the 16th Fr. Corps arrived on the 2nd and recovered Wytschaete. A pause

of some days followed, while the Gers. waited for reinforcements. On the 6th there was an attack on Zillebeke repulsed by the British Household Cavalry, and then ensued a further pause until the 11th, when the Prussian Guards charged on the Menin Road against Gheluvelt and drove back the 1st Division into the woods; but counter attacks recovered most of the lost positions. With the arrival of further reinforcements for the Fr. on the 17th, the Gers. gave up further attempts to break the line, which now settled down for the winter.

Net Results of the Campaign.—Before attention is given to the campaigns on the Eastern Front, which had considerable effect on the Ger. dispositions in the W., it is necessary to consider the position of the combatants. Germany had secured the great mining and other industrial resources of Belgium and some of the coalfields of northern France, and the loss of these was to put a great strain on the Allies and prolong the War, but Germany required time to make use of her captures. British and Fr. losses had been very heavy and time was needed to renew them. The chief difficulty for Britain was to train and equip the masses of recruits from all parts of the Empire in a short space of time. The Territorial Army created by Lord Haldane, provided the first line of reserves. Although recruited for home defence, its members volunteered almost without exception for foreign service. From all parts of the Empire, also, recruits were arriving, a tribute to the solidity of the bonds of the Empire. Indian troops appeared at Ypres, and the first Canadian contingent landed at Liverpool on Oct. 16, to be followed by thousands from Australia and New Zealand and finally from S. Africa where for the moment the task of repressing rebellion and fighting the Ger. S.W. Africa kept the S. Africa volunteers occupied. At home in Great Britain the nation was settling down grimly to carry on the war, and the feeling of being flung into chaos had thus stunned the people for the first month or two gave place to a revival of hope when the Ger. advance was at last checked and held. The bombardment by Ger. battle-cruisers of several open towns on the E. coast of England on Dec. 16—the first time since the Dutch sailed up the Thames estuary in the seventeenth century that an enemy had attacked the British shores—so far from upsetting the national moral, proved to be stimulant to recruiting.

(iv.) THE EASTERN FRONT IN 1914.—*Russian Invasion of East Prussia.*—It had been generally a

sumed that Russia's unwieldy masses could only be moved very slowly, but that later on her immense resources of men and material would prove formidable. In the event Russian troops invaded E. Prussia almost as quickly as Ger. troops invaded France and Belgium, and by the end of the first week in August, a flight towards Berlin had begun. Russia's Polish prov. was an almost impossible salient to defend, and her first need therefore was to attack on the flanks in E. Prussia and Galicia, in order to straighten her front. The Russian armies were under the supreme command of the Grand Duke Nicholas, who was one of the very few officers of royal blood to prove during the War that he was a competent professional soldier. Rennenkampf was the general in command of the Russian 1st Army in the E. Prussian campaign. He had been one of the few Russian officers who had made rather than lost a reputation in the Russo-Japanese War. On August 20, the Russians captured Gumbinnen, and Rennenkampf occupied an important railway junction at Insterburg, while on the 21st Samsonov, commanding the Russian 2nd Army operating to the S. in E. Prussia, turned the Ger. right and drove the Gers. back on Königsberg to join the fugitives from Rennenkampf's attack. By the 25th E. Prussia was open to the Russians and alarm in Berlin was intense. The occupation of E. Prussia was particularly galling to the Prussian nobles, because it was the area from which most of them drew their territorial titles and where were most of their country estates. The Kaiser's own shooting-box was now in Russian hands. Russian cavalry had driven crowds of refugees far into the W., and old legends of Russian barbarity in the Napoleonic wars caused panic among the Ger. pop., and even today the Gers. complain of unnecessary devastation by the Russians in E. Prussia during these months. Meanwhile, Austria, although she had a million troops in Galicia, had failed to secure more than a strategic retirement of the Russians by her offensive against Lublin, and the Russians under Ruzsky and Brussilov had overrun the eastern borders and menaced Lemberg. But the Russian advance into E. Prussia had reached its furthest point. The Gers. withdrew the incompetent General von François, and replaced him by Paul von Hindenburg, a comparatively unknown retired general who was to become one of the greatest figures in modern Germany and the world. As Chief of Staff he

was given Ludendorff, who had qualities of mind which, in combination with the strong personality of Hindenburg, proved one of the strongest factors in Germany's later campaigns. At this time Hindenburg was already approaching seventy, but he was a man of iron constitution, and he possessed considerable knowledge of E. Prussia, which he quickly put to good use. Within five days he had collected 150,000 men and faced Samsonov, on a line stretching from near Allenstein S.W. towards Soldau, with marshes in front, the ways through which he knew, but Samsonov did not. By this move Samsonov was practically isolated and on the 31st the Russian forces were almost annihilated, and Samsonov died during the retreat, after losing in the Battle of Tannenberg (*q.v.*) two-thirds of his forces, and innumerable guns and equipment. This was one of the most complete victories of the war.

German Invasion of Russian Poland—Russian Advance into Galicia.—The veteran Hindenburg became the idol of the Ger. people, and the adulation was well merited, for Rennenkampf, with his communications now threatened, was compelled to retreat over the frontier, and the invasion of E. Prussia had disastrously failed. Hindenburg now advanced across the Russian frontier on a broad front from Wirballen on the left to Augustovo on the right, and occupied Suwalki, the cap. of the frontier prov., without resistance. But in the S. the position was much more favourable to Russian arms. (See RUSSIAN FRONT (GREAT WAR, CAMPAIGNS ON).) The three Russian generals were all remarkable men; Ruzsky, formerly like Foch a professor of a military academy, was the most scientific; Brussilov (*q.v.*) was then unknown but was soon to become one of the most conspicuous Allied generals; and Dmitrieff was a Bulgarian who had been the popular hero in the Balkan Wars, and had now returned to the Russian service in which he had received his original training. These three were responsible for the Russian effort in this region. The Russian strategy was to straighten the frontier, and accordingly the Gers. encountered little opposition when they advanced towards the Polish centre of the frontier line, while the Austrians were allowed to advance towards the R. Bug. But Galicia was the main objective of the Russians, and for Austria it was essential to hold the prov. with its seven lines of strategic railways through the Carpathians. Brussilov, advancing from the S.,

captured in succession Tarnopol and Halicz, and forced his way across the series of rivers guarding the right flank of Lemberg, and on Sept. 1 the Battle of Lemberg began, Ruzsky and Dmitrieff already being in position N. and S. of the city. The Russians rapidly completed their encircling movement and by Sept. 3 the city was abandoned by the Austrians. Apart from the supreme importance of Lemberg as a railway centre and cap. of Eastern Galicia, the capture of the city provided the Russians with immense stores of all kinds, and they took 100,000 prisoners during the fighting. The whole Austrian army then fell back behind the Vistula and the San. Von Auffenburg, who had defended Lemberg, withdrew to the fortress of Przemyśl, and the whole of the rest of Galicia was in Russian hands by about the date of the Battle of the Marne in the W., so that the combined strategy in E. and W. had achieved substantial results for the Allies. Meanwhile Hindenburg in the N. continued his advance into Russia until he reached the Niemen; but there the vigorous Russian artillery attack and the inability of the Gers. to find emplacements for their guns in the marshy ground checked him. The check became a retreat on Sept. 27, a retreat during which the Russians inflicted heavy losses, particularly in the forest of Augustovo.

The Struggle for Cracow.—By Oct. 1 the Russian cavalry were again across the Ger. frontier, and Hindenburg was called S. to Poland to repel the Russian advance on Cracow, which his movement in the N. had not stopped. The need was urgent, for the possession of Cracow would open the door to Silesia, and give access to Vienna. In any case the loss of the rest of Galicia was serious, for her oil-wells were the main source of the Ger. supply of petroleum, and her Slav pop., once assured of Russian success, would throw off its Austrian allegiance and induce the Czechoslovaks in the S. to follow its example. In Sept. 1914 there seemed good prospect of these hopes being realised. Jaroslav fell on the 23rd, Przemyśl was surrounded and Russian cavalry crossed the Carpathian passes into Hungary. In these circumstances the German and Austrian commands were unified under Hindenburg, who now prepared to check the Russian advance by a blow at their centre in Poland. Ruzsky was now in command in Poland, and Ivanoff, with Brussilov and Dmitrieff as his lieutenants, in Galicia. Hindenburg's plan was to attack along the radial

railway lines leading to Warsaw from Thorn, Kalisch, and Czenstochowa while the Austrians made an advance through Galicia, relieved Jaroslav and Przemyśl, and recovered Lemberg. The Grand Duke Nicholas foresaw Hindenburg's intentions, but concealed his own counter-plan by giving the appearance that he was about to retire from the Polish salient. Actually he proposed to hold a position behind the line of the Vistula, except for Warsaw, which stands on the W. bank of that river, and to counter-attack round the N. of the Ger. left wing under the great fortress of Novo Georgievsk. On Oct. 19 he made this surprise move, forced back the Ger. left, and threatened the Ger. centre. By Nov. 1 the Gers. were in retreat, abandoning even Lodz, and destroying communications as they withdrew. The Austrians whom Hindenburg had come S. to help were, unusually enough, the more successful in their offensive, recovering Jaroslav, relieving and re-occupying Przemyśl, and threatening Lemberg; but the Ger. retreat to the N. then compelled the Austrians to retire in Galicia. The Russian advance on Cracow was resumed, and by Nov. 9 their cavalry was only 20 m. from the city. A week before the Prussian Guard made its final attack at Ypres, Belgians had reported the moving of masses of Ger. troops away to the E. The need was urgent, for Cossacks were already across the Silesian border, and Hindenburg required all the help he could get for a counter-offensive. He was planning an attack up the Vistula from Thorn so as to attack the right flank of the Russian advance through Poland on Silesia and Cracow. The command was given to Mackensen. The Gers. attacked all along the line on Nov. 18 against Ruzsky. The Russian centre was broken, and the left thrust back upon Lodz. But the wedge driven into the Russian line was not wide enough and the sides held fast, and Ruzsky began to close the Gers. into a trap. For three days, Nov. 24 to 26, they fought desperately to extricate their forces, and at length the remnant succeeded. Meanwhile the Gers. were rushing troops to Mackensen, and on Dec. 6 the Russians withdrew from Lodz in order to straighten their line against the attack Hindenburg was preparing on Warsaw. But the Ger. advance was now held and the Gers. spent Christmas in the trenches, 35 m. from Warsaw. Meanwhile the Hungarian advance in Galicia, which was another part of Hindenburg's plan, met with better success, and the Russians were driven back from

Cracow, but with reinforcements they swung forward again. Germany now concentrated on driving Russia out of the War, so that the comparative quiet on the Western Front during that winter was compensated by considerable activity in the E.

German Attack on Warsaw.—During Jan. 1915 the Russian centre in front of Warsaw was weakened in response to requests from the western Allies that Russia should divert Ger. troops from the Western Front by attacks on the extreme flanks of the German-Austrian lines in the E. There was a fresh advance towards the Masurian Lakes in E. Prussia and far to the S. Alexeiev captured a Carpathian pass. Mackensen took advantage of this dispersal to make a fierce attack on the Russian centre. The attack began on Feb. 1, but the Russians were able to hasten reinforcements by the two lines of railway which ran N. and S. of the threatened front, and the Ger. advance was stopped. Hindenburg now gave up the idea of a frontal attack and tried to repeat his attempt on the northern flank to pierce the great chain of fortresses which defended Poland along the line of the Niemen and the Narew from Kovno to Novo Georgievsk. In this he was not successful, and by the middle of March had withdrawn his left and centre to cover the Prussian frontier. His right suffered more severely in checking a Russian advance which had been slowly progressing down the right bank of the Vistula. The Gers. captured the tn. of Prasnyusk, but their flank attack on Warsaw, though well conceived, was foiled. On the Carpathian front Russia, endeavouring to bring Rumania into the war on the Allied side, sent a force into the Bukovina, whose pop. was largely Rumanian in sympathy, with the object of convincing Rumania that she would gain this area by supporting the Allies. But the King of Rumania was a Hohenzollern and the sympathies of his subjects were mixed, for there were also Rumanians under Russian rule in Bessarabia. The fighting on this front continued with varying fortunes until on March 22 Przemyśl surrendered to the Russians. After the fall of Przemyśl the Russians were free to make further assaults on the Carpathians, at first with success; but the expectation of a coming Russian victory which was generally held in the W. was little justified when it is realised that the Gers. had now taken charge of the Carpathian front and had sent enormous reinforcements there, while

the weakness of Russia in guns and material was beginning to make itself felt.

(v.) SERBIA IN 1914.—*Failure of Austrian Attack on Serbia.*—Austria's difficulties had been by no means confined to the Russian front. Her 'punitive expedition' against Serbia had been disastrously unsuccessful. Austria's two first-line corps had been withdrawn from Serbia in the early days of the War to take their place on the Russian front, and on account of this the Serbs and Montenegrins made a combined effort on Aug. 12 to invade Bosnia and capture Serajevo. On the 16th the Austrians retaliated by seizing Shabatz in the N.W. corner of Serbia, but on the next day the Serbs routed a large Austrian force in the neighbourhood and the Serbian Crown Prince Alexander followed up this victory by another on the 18th against the Austrians on the Jadar. The result was that by the 24th the Austrians were almost entirely driven out of Serbia. Vienna announced that the punitive expedition (which had cost them 40,000 casualties and 50 guns) had accomplished its object. But the Serbs having followed up their victory by invading Bosnia and capturing Semlin in order to stop the Austrian bombardment of Belgrade, the Austrians were compelled on Sept. 8 to attack again across the Drina, the boundary riv. between Serbia and Bosnia. Fighting continued until the 17th, when the Serbs were again victorious, and for six weeks Serbia was left in comparative peace. But by the end of Oct. the entry of Turkey into the War and the increasing part taken by Ger. troops on the Russian front allowed Austria to undertake a more ambitious campaign against Serbia. Potoriek, the Austrian commander, was enabled, by Dec. 1 to 3, to advance as far into Serbia as the ridges of Rudnik and Maljen, but meanwhile the Serbs had obtained Gk. and other munitions; King Peter of Serbia, old, blind, and deaf, came in person from Nish (whither the Serbian Gov. had retired) to make a personal appeal to his troops, and the Austrian commander was defeated by the sound tactics and strategy of the Crown Prince, Marshal Putnik, and General Mishitch. By the 6th the whole Austrian army was broken and in flight. They suffered 80,000 casualties before they were driven back from Serbian soil, leaving Belgrade once more in the hands of the Serbs.

(vi.) SOVEREIGNTY OF THE SEAS.—*Ger. Seaborne Commerce Destroyed.*—

The control of the seas, which Britain held and kept throughout the War, was vital to the ultimate success of the Allied cause. It did not ensure complete protection of all the Allied coasts from Ger. raids, but it did ensure freedom of movement for the Allies at sea, and its chief importance was an economic one, enabling the Allies to draw for their supplies upon the whole world, while denying the same advantages to the Central Empires. The primary purpose of the British navy was to prevent the enemy from invading British shores, but it was also valuable in allowing Great Britain and her Allies to send forces by sea to all points not commanded by the enemy's armies where operations were in progress. The Ger. High Sea Fleet had withdrawn to its bases on the outbreak of war, and the Ger. plan was to wear down the British navy by a war of attrition with submarines and mines, if British public opinion did not force it to attack the Ger. bases, a proceeding which could only end disastrously. Meanwhile the British Grand Fleet under Admiral Sir John Jellicoe (*q.v.*) was compelled to operate in the North Sea from inadequate bases, while the outlying cruisers in various parts of the world cleared the Ger. mercantile marine from the seas. Some Ger. merchant vessels escaped to neutral ports; but hundreds were made prizes. In a very short time Ger. seaborne commerce ceased to exist. A few Ger. cruisers and armed merchantmen were still at large, and one Ger. Dreadnought, the *Goeben*, with a cruiser, the *Breslau*, escaped to take part in the War later on. They were in the Mediterranean and managed to elude the British and sail to Constantinople, where they played their part in stiffening the Turkish adherence to the Ger. side. (See 'GOEBEN' and 'BRESLAU'.) Armed Ger. merchantmen captured or sunk in the first days of the War included the *Cap Trafalgar*, sunk by the Cunard liner *Carmania* on Sept. 14, the *Kaiser Wilhelm der Grosse*, sunk off Cape Verde Islands on Aug. 27, and the *Spreevald*, captured in the N. Atlantic on Sept. 12.

Mines and Submarines proved from the first the greatest danger to British shipping. The Gers. adopted the method of laying loose mines, which was contrary to accepted rules of war, as involving risk to neutrals and belligerents alike. On Aug. 5 the *Königin Luise* was sunk while sowing loose mines in the North Sea, and on the 6th the British light cruiser *Amphion* struck one of

these mines and sank. A more serious loss was that of the super-Dreadnought, *Audacious*, which sank on Oct. 27 as she was being towed to harbour after striking a mine off the N. of Ireland. But the submarine took more serious toll, and on Sept. 22 one submarine successively sank three old cruisers the *Aboukir*, *Hogue*, and *Cressy*. A fourth cruiser, the *Hawke*, was torpedoed off Aberdeen on Oct. 15 and on Jan. 1, 1915, the *Formidable*, of 15,000 tons, was sunk off Star Point with the loss of 600 of her crew. Four submarines were, however, sunk by British ships in the first few months. The first serious naval action by the British during the War was the fight in the Bight of Heligoland on Aug. 28, in which Vice-Admiral Beatty's battle-cruisers came up to support British light craft and, successfully penetrating the mine-fields, sank the Ger. cruisers *Mainz* and *Köln*. Meanwhile Japan had taken her first step in the War by calling upon Germany to evacuate her Chinese naval base at Tsingtau in the Kiau Chow peninsula, and to send her warships out of Far Eastern waters. The Ger. Pacific squadron under Admiral von Spee left Tsingtau in anticipation of the capture of that port by the Japanese, an event which actually took place on Nov. 7. Already Australian troops had occupied Ger. New Guinea, the Bismarck Archipelago, and the Gilbert and Caroline Islands, while Samoa surrendered to a New Zealand force, and the Marshall Islands to Japan. Von Spee was thus left without a Ger. naval base, and he steamed eastwards across the Pacific, detaching two of his cruisers, the *Königsberg* and *Emden*, to help the Gers. in E. Africa and to raid British commerce in the Indian Ocean. On Sept. 20 the *Königsberg* sank H.M.S. *Pegasus* at Zanzibar, but was soon entrapped in the Rufiji R. The *Emden*, under Captain Müller, remained to demonstrate the possibilities of a solitary raider commanded with gallantry. Throughout Sept. and Oct. she harried British trade off the coasts of India, but was finally destroyed by H.M.S. *Sydney* off the Cocos Islands on Nov. 9. See 'EMDEN'.

Battle of Coronel—Battle of Falkland Islands.—Meanwhile von Spee had gained the S. American coast and found shelter in its harbours and islands. His squadron of two large and three small fast cruisers was opposed on Nov. 1 off Coronel by Admiral Cradock with a mixed squadron of old and slow vessels.

Before the fight one of Cradock's ships, the battleship *Canopus*, which was the most heavily armed, had to fall out, and he was thus reduced to two large cruisers, one small fast cruiser, and an armed liner. Von Spee's two leading cruisers put out of action the two leading British cruisers, and the light cruiser, *Glasgow*, had no option but to use her speed to escape and warn the *Canopus*. Admiral Cradock and 1600 officers and men lost their lives in this action, and none were rescued by the Gers. (see CORONEL, BATTLE OF). There is probably no comparable defeat in British naval history, but it was a fight against odds, and with the appointment of Lord Fisher (q.v.) as First Sea Lord of the Admiralty prompt measures were taken to avenge the defeat. On Nov. 5 he dispatched a squadron under Admiral Sturdee, comprising two battle-cruisers and four lighter cruisers. They picked up the *Glasgow* in the S. Atlantic, and the *Canopus* was now at the Falkland Islands, which Sturdee reached on Dec. 7. Von Spee, having refitted, was making his way to the Atlantic, where he hoped to dispose of the *Canopus* and *Glasgow*, attack the British base at the Falkland Islands, and then cross to support the Boer rebellion in S. Africa. Unaware of the presence of Sturdee's squadron, he approached the Falkland Islands on Dec. 8, to be chased by Sturdee, who sank all his vessels, with the exception of the *Dresden*, which was sunk in March 1915 (see also FALKLAND ISLANDS, BATTLE OF). These two actions clearly demonstrated that weight of metal was to be the deciding factor in naval actions as it had been in the past. The last Ger. cruisers outside their own harbours were now destroyed, and naval action was restricted to the task of blocking the exits from the North Sea and preventing Ger. raids from their bases. Meanwhile the *Goeben* and *Breslau* at Constantinople had played the part assigned to them of impressing the might of Germany upon 'Young Turk' leaders, who had replaced the Sultan Abdul Hamid in 1908, and had ever since been the pawns of Ger. influence in furtherance of the 'Mitteleuropa' plan of a bloc of states stretching under Ger. influence towards the oil-fields of Persia and Mesopotamia. Enver (see ENVER PASHA) and the adventurers in his train were ready to give Germany control of the Berlin-Bagdad route in return for a free hand with the subject peoples under Turkish rule. Millions of Ger. money had been supplied in

furtherance of this scheme before the War, and the Emperor William had posed as the champion of Mohammedanism in the Near East, so that the way was prepared for the 'Holy War' which the Young Turk leaders fomented against the hereditary enemy, Russia. On Oct. 29 Bedouins invaded the Sinai Peninsula, while Turkish gun-boats raided Odessa, and on Nov. 1 the British Ambassador left Constantinople, being unable to outbid the Gers. for the support of the Turkish leaders. The first effects were seen in Egypt, where the Khedive threw in his lot with the Turks and was deposed in his absence, the British assuming the Protectorate; and in Cyprus, which the British had occupied since 1878, but which they now formally annexed.

Ger. Colonial Empire Conquered.—It has been seen that the outlying Ger. islands in the Pacific had been seized by Australian and New Zealand forces. It fell to Boer leaders in S. Africa, Britain's former enemies, to effect the conquest of some of the more important African possessions of the Ger. Empire, and also to suppress a rebellion of some of their own old comrades in arms (see AFRICA, GERMAN EAST—CAMPAIGN IN; AFRICA, SOUTH-WEST; CAMEROON). The smallest African outpost of Ger. colonisation, Togoland, surrendered on Aug. 27. The Cameroons, larger in area than Germany, repulsed the first Allied attack; but on Sept. 27 co-operation between Fr. troops and British warships effected the capture of the cap., Duala, and the whole coast line. The conquest of Ger. S.W. Africa was much more difficult, and was delayed by a serious revolt in the Union of S. Africa, organised by the Boer leader, Maritz, with assistance from de Wet and Beyers. General Botha took prompt steps to deal with the outbreak, and after small rebel successes, de Wet was captured on Dec. 1 and Beyers was drowned on the Sth in trying to cross the Vaal R. Attacks on Ger. E. Africa in 1914 met with serious reverses, and it was to take the British forces four years to secure the final surrender of this more important Ger. possession in Africa.

Ger. Raids on British Coast.—Two Ger. naval raids on the Eng. coast took place towards the end of 1914. On Nov. 3 Ger. cruisers made an abortive attack on Yarmouth, at the same time sowing some mines which afterwards sank a British submarine and two fishing boats; but on Dec. 16 Ger. battle-cruisers carried out a bigger raid evidently with the object of scaring the British

civilian pop. into demanding stronger measures of coast defence and thereby holding back forces required elsewhere. The tns. of Scarborough, Whitby, and the Hartlepoons were bombarded, and at Hartlepool one hundred and nineteen persons were killed and over three hundred wounded. British battle-cruisers came up, but the raiders eluded them in a dense fog in the North Sea. On Jan. 24, 1915, Admiral Hipper came out with battle-cruisers and light cruisers, probably with the object of luring the British fleet on to the mine-fields he had prepared off Heligoland, and an engagement took place near the Dogger Bank between the Ger. cruisers and Admiral Beatty's battle-cruisers. One Ger. cruiser was reduced to a wreck and one British cruiser, the *Lion*, was damaged; but the Ger. vessels after a severe battering escaped through their mine-field. The result of the engagement was indecisive, but it left no doubt about the command of the seas.

American Attitude towards British Blockade.—During the spring of 1915 considerable resentment was aroused in America by the British blockade of Ger. ports, which interfered with American shipping, and there was criticism of America in England; but the situation was radically changed by the colossal blunder of the *Lusitania*. It was on May 7 that this passenger liner was torpedoed off the S. coast of Ireland with the loss of 1100 people, many of them women and children, and some of them Americans. During the winter of 1914-15 and the following spring, air raids began to play a considerable part in the War. There was a British sea-plane raid on Cuxhaven on Christmas Day 1914, and the Fr. carried out several air raids on military objectives in Germany; but the Gers., pursuing their policy of 'frightfulness,' made use of air raids over Britain principally to sow panic among the civil pop., and airships were the means generally employed, as they were capable of long cruises and of carrying a great weight of bombs.

Ger. Air Raids.—During the early months of the War the lights of London and of coast tns. had been dimmed in anticipation of air raids, the first Zeppelin raid taking place over Norfolk on Jan. 19, 1915, without appreciable damage. More damage was done to property by a raid over the Tyne on April 14, and four more raids were made during April on various points on the E. coast. On May 10 a woman was killed and some houses demolished at Southend, and on May 31 the

Zeppelins first reached London. The E. and N.E. coasts were repeatedly raided in June, and by the end of the first year of the War eighty-nine civilians had been killed and two hundred and twenty injured (see AIR RAIDS).

(vii.) ALLIES AND THE NEAR EAST.—*Man Power and Economic Resources of Allies and Central Empires.*—The beginning of 1915 found the Allies in a mood of optimism. Germany had failed to achieve anything approaching the sum of her ambitions, and time was all on the side of the Allies. The Ger. advance in the W. had been held, and in the varying fortunes of war on the Russian front Russia had at least held her own with the Central Powers, and had caused the diversion of large numbers of Ger. troops from the W. It is difficult to compute exactly the relative war strengths of the man-power of the nations engaged in the War. Russia had, no doubt, almost unlimited reserves of men, but limited in their effectiveness only by her inadequate transport arrangements. Her war strength on mobilisation may be estimated at about four millions, with a surplus of another two millions of drilled reservists, and a militia of another million. Germany could provide for a mobilisation of at least four million highly trained men and could maintain under arms at least six millions, with an addition from the new classes called up each year of 500,000. Austria-Hungary could count on putting some six million men, trained and untrained, into the field. France could count on about four million men within a month of mobilisation, trained and partially trained; but her chief weakness was in her renewals, which could not be more than 200,000 a year against the Gers.' 500,000. All these armies represented 'nations in arms,' varying greatly in efficiency of training and equipment; but all founded on one or other system of conscription. Great Britain was in a different position, having only a small professional army intended mainly to patrol her far-flung empire and for home defence, and a Territorial Force or volunteer citizen army, providing a nucleus for rapid expansion in time of war. At the outbreak of war the Expeditionary Force available for immediate use numbered 160,000. The total strength was about 250,000, with the Army Reserve of 145,000, the Special Reserve of 81,000, and the Territorial Force with a peace establishment of 316,500, of which it was short by some 50,000 and the National Reserve of 200,000. But in a prolonged war in which Great Britain needed to mobilise her

man-power she could count, with her colonies and dependencies, on mobilising in three years some five million men. This, however, lay in the future, and at the outbreak her contribution consisted largely of economic assistance to her Allies, in financing their efforts and assisting them with supplies through her mastery of the world's carrying trade (*see also* **BRITISH ARMIES IN THE GREAT WAR**). The economic position of the combatants was similar to that of besieged and besiegers of a city. Germany and Austria were in the position of the besieged and their economic position was accordingly simplified. They could do no trade except with or through their neutral neighbours; they had no exports and therefore must pay for all their diminishing imports by cash or foreign securities, and their primary need was to provide from their internal resources supplies for their armies and food for their pop. France and Russia were alike in the fact that both had universal service, which by the withdrawal of men from industry had disorganised their economic life; but both were still in touch with the outer world. Great Britain's economic position was much more complicated. She was still carrying on normal trade, and in addition had to equip her own growing armies, to ensure adequate food supplies for herself and her Allies, and to finance her own and her Allies' efforts, which involved the maintenance of her own credit. In addition to this, in the spring of 1915 she was involved in labour troubles, which the other belligerent nations avoided by conscription. But the various steps which the gov. was compelled to take in order to meet this industrial threat may be regarded as an inchoate movement towards gov. control. Opinion among the Allied military leaders was divided at this time. There were those who regarded concentration on a victory on the Western Front as the only hope of a successful issue to the War, and there were others who regarded a diversion in the E. as the most likely way to embarrass the Ger. main attack. Both schools of thought were inclined to dogmatise; but there is little doubt that the attack now planned on the Dardanelles (*q.v.*) had much to be said for it, if a proper combination of naval and military attacks had been made.

British Attacks in the Persian Gulf and the Dardanelles.—We have seen that Turkey had been manoeuvred into the War on the Ger. side. She had attacked Russia in the Caucasus (*q.v.*) and had been repulsed with heavy losses, and she had made two

abortive attacks on the Suez Canal in an attempt to stir up Egyptian feeling against the British occupation. The British retort to these attacks was made in the Persian Gulf and the Dardanelles. Good use was made of the Indian army in an attack on the Turks at the head of the Persian Gulf. The Turks made little headway against the British advance, and in April 1915 they suffered a heavy defeat with some 6000 casualties, with the result that the Arabs became converted into allies of the British, and the way was now open for a British advance on Bagdad as soon as autumn made further activity possible in the great heat of that area. But the successful operations in the Persian Gulf were of minor importance compared with the threat to the heart of the Turkish Empire involved in the Dardanelles expedition. Attack on the Dardanelles was the best defence of the British position in Egypt; Allied success there would almost certainly bring in Rumania on the Allied side with all the advantage of an extended line of attack, and would deter Bulgaria from hostile intervention and even induce her to join a Balkan alliance against the Turkish and Ger. power. Italy's position as a member of the Triple Alliance who had not yet taken up arms with her allies was also an important consideration. During the winter and spring of 1915 prolonged diplomatic efforts were directed to the task of bringing in Italy on one side or the other.

Italian Diplomacy.—On the outbreak of the War Italy had declared that the Ger. action was offensive in character and that she was not therefore compelled to intervene under the terms of the Triple Alliance. Allied diplomacy fixed on the Italian grievances against Austria (*see* **AUSTRIA-HUNGARY**) concerning the reciprocal compensation which Austria and Italy had promised each other in case either was forced to disturb the *status quo* in the Balkans. Austria's argument was that her invasion of Serbia did not constitute a permanent disturbance, since no annexation was contemplated, to which Baron Sonnino, the Italian Foreign Minister, replied by reminding Austria that, during the Turkish-Italian War, Austria had declared that an Italian bombardment of the Dardanelles or even the use of searchlights against the Turkish coast would be a breach of their agreement. In March 1915 Baron Burián (*q.v.*) accepted the principle that compensation was due to Italy, and the Italian Gov. proceeded to extend its demands to include not only the whole of *Italia irredenta*, the

area of Italian pop. in the Trentino and across the Adriatic which had been left under the Hapsburgs after the wars of Italian liberation, but also practically the whole north-eastern coasts of the Adriatic, largely populated by Slavs. It was obvious that these claims could not be met by the Allies if they won the War, because they would involve concessions at the expense of the Serbs and of the other Slav races in Bosnia-Herzegovina (q.v.), and, if the Central Empires won, their record in the keeping of treaty obligations showed little likelihood of their honouring promises extorted by the Italians under threats. Italy continued to increase her demands, remembering that she was also the 'heir of Venice' and as such demanding as her right the Gk. islands in the Aegean Sea which she had seized and held in the Turkish war (see under *ÆGEAN ISLANDS*). Obviously her claims were going to conflict with those of Serbia; but the value of her participation seemed to the Entente worth the risk of later difficulties, and on April 26 the Treaty of London was concluded which conceded to Italy most of her demands. But she still remained at peace with Germany for another year, and although she declared war on Austria on May 22, she confined her efforts to attempts to secure the territory at which she aimed. Admittedly Italy's difficulties were considerable. She still had to maintain an army against the Turks in Tripoli, she lacked coal and adequate industrial equipment, her troops were not in general up to the high standard of her Alpini and Bersaglieri troops (q.v.), and Austria held all the key positions of the difficult Alpine frontier. After some slight initial successes Italy did not seriously hamper the Austrian effort, and there were diplomatic difficulties arising from her intervention, particularly in Greece, which had serious consequences to the Entente Powers. King Constantine of Greece, married to the Ger. Emperor's sister, and strongly pro-Ger. in his sympathies, was to prove a continual thorn in the side of the Entente, and he was unlikely to assist Powers allied with Italy in view of Italy's claims to Gk. islands. The Serbs showed their racial feeling against Italy when that country intervened on the Allied side by making a dash for the Adriatic coast claimed by Italy (see also *ADRIATIC QUESTION*). Thus there were serious possibilities of trouble between two of the Allies and one therefore neutral Power, which were to have dangerous repercussions during the War. Meanwhile the Dardanelles expedition had suffered

from divided counsels and was to prove a disastrous waste of men and material. The expedition was foredoomed to failure from the fact that the Turkish batteries which defended the Straits were more than a match for any naval guns. The Fr. could not spare any of their troops on the Western Front, and probably it was hoped to secure the co-operation of Gk. troops, but these were withheld by the vigorous opposition of the Prussian Queen of Greece.

The Dardanelles and Gallipoli.—The purely naval attack began on Feb. 19, and three successive squadrons of British and Fr. ships were sent up the Straits, only to meet Turkish floating mines and land torpedoes, which were so effective that one Fr. battleship, the *Bouvet*, with most of her men, and two Eng. battleships, the *Irresistible* and *Ocean*, were sunk. On April 25, 1915, the second attempt to force the Straits began, when an Anglo-Fr. force under General Sir Ian Hamilton attempted a series of landings. This force comprised the 29th Division, the Naval Division, a Territorial Division, and the Australian and New Zealand Divisions which had been serving in Egypt, and also a detachment of Fr. colonial troops, some *fusiliers marins*, and the Foreign Legion. The Turks were commanded by the Ger. General Liman von Sanders (q.v.). The attempts began at six different points. The Australian and New Zealand troops landed at Gaba Tepe, later famous under the name of Anzac (q.v.), from the initials of the force. Another attempt was made in front of the village of Krithia and the remaining four attempts on the beaches stretching from Tekke to Morto Bay round the point of the peninsula. Most of the attempts were successful, except at Sedd-el-Bahr, where concentrated Turkish fire prevented the troops from disembarking from their boats for thirty-two hours, and near Krithia, where on the 26th a Turkish counter-attack drove them back to their boats. The Anzacs reached nearly to the summits of the hills overlooking the Straits, but they suffered heavy losses in a counter-attack. The result of this first attempt at landing was to give Hamilton possession of the extremity of the peninsula, and of an exposed ridge of cliffs at Anzac; but he had failed in the hope of inflicting a surprise defeat on the Turks, and the struggle for Gallipoli resolved itself into a costly attack by inferior forces on land against almost impregnable positions, in which the Turks with 200,000 men held posts rising in

places to over 700 ft. and defended by masses of artillery and machine guns. Two British submarines succeeded in penetrating the Straits and gallantly interfered with Turkish communications across the Sea of Marmora; but Turkish reserves were soon despatched along both shores, and when a second attack was made on May 6-8, the naval guns of the supporting fleet failed to destroy the Turkish trenches and an advance of one thousand yards was achieved only at the price of losses in men amounting by the end of May to more than the total British losses in battle during the S. African War. A third attack on June 4 confirmed the impression that nothing short of a large army could master the position. Meanwhile a Ger. submarine was threatening the naval supports; the *Goliath* had been sunk by a Turkish gunboat on May 12 and submarines had disposed of the *Triumph* on the 26th and the *Majestic* on the following day. The *Queen Elizabeth* and the other more important battleships then withdrew to safer waters, and the naval attempt on the Dardanelles was gradually transformed into a land siege of the peninsula. (See also DARDANELLES.)

(viii.) THE EASTERN THEATRE OF WAR IN 1915.—*Mackensen's Galician Drive*.—During 1915 the centre of importance in the conflict shifted from the Western to the Eastern Front. Germany saw that the enemy she could most easily defeat was not France but Russia, for Russia was badly equipped with munitions at the outset and did not possess the necessary industrial organisation to make good the defect. Her allies could not help her, because at this time they required all the munitions they could produce for their own needs, and in any case their means of communication with Russia were difficult and uncertain, whether by the route to Archangel, the immensely long and inefficiently worked single-track Trans-Siberian Railway, or the shorter route by the Dardanelles, which had not yet been, nor seemed likely to be, forced. Germany had therefore the best of reasons for concentrating on Russia's subjection as quickly as possible. She continued during the winter rapidly to produce guns and munitions for the Russian front, and was entirely successful in keeping these preparations secret. Russia's vast Polish salient was a further weakness. It was protected by the Carpathians on the S., and the passes were extremely difficult for the transport of heavy artillery; but if once the Gers. could make an advance in Galicia the Carpathians would be useless and the Russian armies in Poland exposed. Macken-

sen began his advance on April 28 with an attack on Dmitrieff's left at Gorlice, so that the Russian general was compelled to weaken his centre along the Biala in front of Ciez-kowice. Then on May 1, the Gers'. long preparation of munitions took effect in an overwhelming barrage of the Russian positions. It is said that over 700,000 shells were fired by the Ger. guns. The Russian defences were completely destroyed, and the Russians could make little reply, so that the Gers. were able to cross the Biala and to capture Ciez-kowice and Gorlice, and to break Dmitrieff's line. On the 2nd, Dmitrieff was in full retreat to the R. Wisloka, 20 m. in the rear, where no position had been prepared, and Mackensen forced his way across the riv. on the 7th and pushed on still further. This advance compelled Brussilov's army to retire hastily from the edge of the Carpathians and, in the retreat, his losses were heavy; but a stand by the Russians to the N. and a counter-attack in the S. enabled the Russian armies to re-form with the Polish forces conforming to the new line of the main armies, which were on a line from Jaroslav to Kosziowa, with their centre at Przemyśl. For the rest of the month Mackensen advanced irresistibly, delayed to some extent by counter-attacks, but never seriously held up. By the 18th he had captured Kosziowa and seized the line of the San from Sieniawa to Jaroslav. As the Russians had not added to the fortifications of Przemyśl since they had captured it, it was obvious that it could not hold out against the Ger. howitzers unless the Russian armies could keep in touch with it. This they were unable to do. They succeeded in delaying the Ger. advance until the stores were removed; but on June 1 Przemyśl was evacuated. On the same day von Linsingen captured Stryj and on June 7 he crossed the Dniester. But he had advanced too far ahead of his communications and on the 8th Brussilov drove him back again with great losses.

The Fall of Lemberg.—Fighting continued on the Dniester for a considerable time; but the Russian stand there did not interfere with Mackensen ensuring the fall of Lemberg by turning the Russian position about Grodek. At the Battle of Rawa Ruska on June 20, he cut the Russian communications N. of Lemberg and the cap. of Galicia once more fell into Austrian possession on the 22nd. The Russians had treated the inhabitants unwisely during their occupation, and great ill-feeling had been aroused

by their attempts to proselytise for the Orthodox Church and by the treatment of the Archbishop of Lemberg, a member of the Uniate Church which had come to terms with Rome. After the fall of Lemberg the Russians lost the line of the Dniester as far as Halicz (*q.v.*) and the country beyond it, including the Bukovina (*q.v.*). They fell back on the Gnilia Lipa, where Ivanov offered a prolonged resistance. But the Ger. advance had achieved all its objects except the complete defeat of the remnant of the Russian armies in Galicia. The capture of Lemberg was of supreme importance, because the city was much more easily defensible by the Gers. than by the Russians, on account of the ample lines of communication from the S. and W. and the poor lines of communication from the E. and N. Beyond this point in an easterly direction the Gers. had no desire to go, and their front was now swung round to face N., where the Russian armies in Poland were outflanked. The success of the great drive in Galicia restored Austrian and Hungarian confidence and lessened Allied influence in the Balkans, sufficiently valuable gains for the Central Empires; but it was only the opening move in a much more ambitious scheme, which ultimately developed into the most successful Ger. operation in the War. Already a corresponding advance had been made by von Bülow on the N. of the great Polish salient. Libau had fallen on May 9, and during that and the following month the Gers. occupied the duchy of Courland as far as Windau on the coast, and Shavli half-way to Riga. The Russians regarded this advance with comparative indifference, not realising that it was all part of a comprehensive scheme to envelop Warsaw.

German Offensive in Poland.—The Gers. planned to outflank the Russian position in Poland by striking at Vilna from the N., with a naval attack on Riga as part of the campaign. The Austrian Prince Leopold's forces fronting Warsaw were comparatively small, and were only intended to achieve the spectacular triumph which would have been prepared by the Ger. drive from the N. and the corresponding move from Galicia on the S. Although the Gers. might ignore Austrian susceptibilities in cases of necessity, it was always part of their scheme in the E. to allow the Austrians the appearance of victory. Just as Mackensen had allowed the Austrians to enter Lemberg first, instead of himself, so Leopold was to fill the rôle of conqueror of Poland. But

Mackensen's Galician armies had first to face N. so as to take their part in Hindenburg's general plan by driving back the Russians across the railway between Lublin and Kovel. Only a few days after the capture of Lemberg these armies proceeded to carry out this turning movement. They advanced in two columns, one under the Austrian Archduke Joseph moving towards Krasnik on the road to Lublin, and the other under Mackensen himself towards Krasnostav on the road to Cholm. This advance across the Russian frontier made it necessary for the Russian armies in Poland to the W. of the Vistula to fall back towards that riv. to avoid being isolated in the extremity of the Polish salient. By July 2, the Archduke entered Krasnik; but on the 5th the Russians had been reinforced and drove him back in a battle lasting until the 9th. Mackensen, too, was held up in front of Krasnostav, and a week's artillery duel ensued for the control of the Lublin-Cholm railway, running E. and W. On the 16th Mackensen resumed his advance, at the same time as von Gallwitz moved on the extreme N. of Poland on the Polish side of the E. Prussian frontier. The combined pincer-like movement was beginning. Although the Archduke Joseph failed to advance after a number of attacks, Mackensen reached a point within striking distance of the railway, while Gallwitz, having driven the Russians from Prasnysz, reached the R. Bug by the 25th, within 20 m. of the Petrograd-Warsaw railway. His advance exposed the great line of Russian fortresses along the Narev R. to the fire of the Ger. heavy guns. The Russians in front of Warsaw withdrew to their inner defences around Blonie, and to the S. were compelled to make progressive retreats until they were finally driven back on the fortress of Ivangorod on the Vistula. Even Ivangorod was now threatened by Mackensen's advance, and on the 30th the Gers. captured Lublin and Cholm. The fall of Warsaw could now no longer be avoided, and indeed the Grand Duke Nicholas had decided on its evacuation some time before, the defence made by the Russians being intended rather to cover the withdrawal of stores from the city than to prevent its capture. On August 4 the Russians abandoned the lines at Blonie and marched through the city, blowing up the bridges over the Vistula as they went. Next day Prince Leopold made his entry. The fall of Warsaw had effects more far-reaching than the Gers. realised, for it marked the beginning of the

end of Russian domination of Poland.

Russian Bureaucratic Incompetence.—The incompetence and corruption of Russian bureaucracy was beginning to have even more serious effects than the loss of Poland. Everywhere there was neglect of essential provision for the troops and no promises made by the Russian rulers, such as that of self-government for Poland, had been kept. Before the War much of Russia's industrial and transport organisation had been in Ger. hands, and after the War began much of it was still left in Ger. control through almost incredible stupidity or treachery, so that the Putilov munition works, for instance, were reduced to working on half-time just when every shell was urgently required, the shortage being so great that the artillery of one army was limited to two shells a day, while one whole division had on one occasion to face an attack without a single rifle. In the face of such knavery and inefficiency the conspicuous brilliance of some of the Russian generals such as Brusilov (q.v.) and Russky (q.v.) and the patience in adversity of the Russian soldier were entirely unavailing. The withdrawal from Warsaw was the first step in the Grand Duke Nicholas's projected retirement from the whole Polish salient, and he hoped that his flanks would hold out long enough to enable the main retreat to be effected safely. He left a strong garrison at Novo Georgievsk to hamper the Gers.; but the most dangerous point was on the line of the Narew where von Bülow was about to attack the fortresses. On August 10, Lomza was captured, and on the day that Warsaw was taken the bombardment of the most important of the Narew fortresses, Kovno, began. Kovno was the angle of the Russian base, and the loss of it would also make it easier for von Bülow to complete his wheeling movement by way of Vilna so as to threaten the Russian communications. Kovno fell unexpectedly soon, on the 17th, and the general in command was afterwards sentenced to a long term of imprisonment for lack of adequate defensive measures and absence from his post.

The Russian Retreat—German Blow at Vilna.—After Kovno other fortresses fell rapidly, Novo Georgievsk on the 19th, Ossowiec on the 23rd, and Brest-Litovsk, the centre of the Russian base-line in Poland, on the 26th. On the same day Augustovo (q.v.) was evacuated and Bialystock (q.v.) captured. On September 2 the Russians abandoned Grodno, leaving the whole line from Brest-Litovsk to

Kovno in the hands of the Gers. The Russians were driven back into the Pripet Marshes, which were at their driest at this season, so that they presented few obstacles to the advance eastwards of Mackensen from Brest-Litovsk, with the result that he quickly reached Pinsk on the railway to Moscow. In Galicia Ivanov was driven back to the Sereth, and in the far N. von Bülow was advancing on Mitau and Riga, thus threatening the Vilna-Petrograd railway and forcing the Russians to continue their retreat along narrow lines of communication which would inevitably become congested. At the same time a naval attack in the Baltic was planned to assist this northern movement, but here the Gers. erred in their arrangements, attempting to land troops in flat-bottomed barges at Pernau on the 17th without first securing their communications by sea, with the result that the entire force was captured or destroyed, and the Russian fleet engaged the Gers. and sank or put out of action two Ger. cruisers and eight destroyers with the loss of only one gunboat. This sensational Ger. naval defeat made the Russians safe in the Baltic. But von Bülow still advanced, and attempted without success to cross the Dvina at Friedrichstadt. The main Ger. effort was then directed towards Vilna. The length of the Russian line and their heavy losses had left a gap between Dvinsk and Vilna, and the Gers. poured masses of cavalry into this gap and very nearly broke through. On the 13th the Russians began to evacuate Vilna, and by the 17th reinforcements of Ger. cavalry had travelled as far as Vileika, nearly 70 m. E. of Vilna, and were threatening the Russians retiring from that city. At this critical moment Ruzsky was restored to command of the northern Russian armies and succeeded in relieving the position, and in gradually straightening the lines so that they ran nearly due S. from Dvinsk by Postavy, Lake Narotch, and Smorgon. Successful as was Ruzsky's effort, it was undoubtedly aided by the fact that the Gers. had reached the limit of their advance, on account of the length of their communications over difficult country without adequate railways and roads, and on account of the necessity for guarding against surprise by a hostile pop. In the S. the Gers. were also driven back. On September 7, Ivanov counter-attacked Mackensen's advancing forces from Rovno, and Brusilov and Lechitsky counter-attacked on the Sereth, the latter taking some 17,000 prisoners. Al-

though the Russians failed to follow up these successes in N. and S., yet they renewed optimistic feelings and a determination to drive out the Gers., which was expressed by the assumption of the supreme command by the Tsar himself in place of the Grand Duke Nicholas, who was given the command in the Caucasus. The Grand Duke was accused of various errors in strategy, but it is doubtful whether any other general would have been much more successful against the weight of the clever Ger. advance, especially when the inadequate provision of munitions and other war materials for the Russian armies is taken into account. In spite of the temporary optimism, the Russian defeat was to have a profound effect on the course of the War, and to involve the complete overthrow of the bureaucratic system which was largely responsible for it. Miliukov raised the question of responsible gov. in the Russian Duma, and the Duma (the Council of State) pressed for reforms; but corruption in high places continued unabated, and the Tsar's assumption of the supreme command only emphasised his complete lack of grasp of military as well as of civil affairs. General Brussilov, in fact, records in his memoirs that the Imperial Court officials spent their time in devising distractions for the Tsar, who found life at General Headquarters excessively boring, since he was treated as a cipher. The foolish Empress continued to attract around her many disloyal elements, chief of whom was a Russian peasant, Rasputin (*q.v.*), whom she believed to possess divine inspiration, and under whose influence the Tsar also fell. The state of the Fr. court before the Fr. Revolution is comparable only with the degeneracy of the Russian court at this crisis.

(ix.) WESTERN FRONT, 1915.—*Allies' Spring Offensive.*—Military assistance, as already stated, had been refused for the Dardanelles operations, the reason being that the Allies were planning a great offensive on the Western Front in the spring of 1915. Later, when it became obvious that a naval attack alone could never carry the Straits, troops had to be diverted from the Western Front though required for the success of the offensive there, so that the Allies attempted to conduct simultaneously two important offensives with forces sufficient only for one. Even in the W. the old idea that separate attacks would defeat the Gers. still persisted, and there was no effective co-operation between the attacks at different points along the

front. Even the slight general control which Foch had been allowed to exercise in the autumn seems to have lapsed by the spring. The Fr. offensive began in the Woëvre, while the British began at Neuve Chapelle, a village at the foot of the Aubers ridge. There was a Ger. salient there, and if the ridge could be carried it would threaten the Ger. hold on Lille, and might cut off La Bassée and straighten the line. The attack began on March 10, with a concentrated artillery bombardment which was more effective than any previous Allied bombardment and destroyed trenches and machine-gun posts over a wide area. On the British centre and right the 4th Corps and the Indian Corps were enabled by this preparation to advance beyond Neuve Chapelle as far as the slopes of the Aubers ridge; but on the left the 23rd Division suffered severely because the artillery preparation here for some reason unknown had been almost entirely useless, and the troops were faced with unbroken wire entanglements, while the Gers. behind their unbroken defences were able to enfilade the British who had broken through on the right. In different staff work was also responsible for reserves arriving late or getting lost, with the result that the British could make no further advance and the Gers. had leisure to bring up reserves before the attack was resumed two days later. The British claimed that the Gers. had lost 20,000 men, but the Gers. estimated their casualties at 12,000, while it is certain that the British casualties were about 13,000, and the total gain to the Allies only a village and a strip of land 3 m. by one. The Fr. were rather more fortunate, but their successes in the Woëvre and Alsace were local and were of no greater value than the British to the general plan of campaign. Early in April they gained the plateau of Les Eparges and advanced towards Etain on the road from Verdun to Metz, while they made some progress between St. Mihiel and Pont-à-Mousson. In Alsace they took Sondernach and advanced during April towards Metzeral and Münster, and recovered the summit of the Hartmannsweilerkopf. The failure of the Russian offensive at this time made it essential to try some plan which would prevent the Gers. sending more troops from the W. to the E., and the point chosen for the Allied activities was Lille, a great railway centre and important as protecting the right of the Ger. line along the Aisne and the left of their line on the Belgian coast.

German Gas Attacks.—The Gers.,

however, anticipated this move and began a counter-offensive against Ypres which was probably not intended as a major operation, but gave them the opportunity to try the use of chlorine gas. This proved a formidable surprise to the troops, Fr., British, and Canadian, along the Yser Canal. The gas attack N.E. of Ypres coincided with an attack on Hill 60 (q.v.) at the S.E., which resulted in some of the fiercest fighting of the whole War. The battle for Hill 60 lasted for five days and at the end of it British troops still held what remained of the hill. The gas attack developed to the N.E. of Ypres on the evening of April 22, and when the clouds of poisonous vapour reached the Fr. Territorial soldiers, who were unprovided with any protection against the gas, they broke and fled, leaving the Canadians on their right exposed on the flank. The Canadian troops behaved with gallantry under exceptionally difficult circumstances and by a counter-attack temporarily recaptured some guns and held up the Ger. advance. On the 23rd the place left open by the Fr. was filled with reinforcements from the 23rd Division; but the Gers. had crossed the canal at Het Sas and Lizerne, and the Canadians were fighting on three fronts between St. Julien and Grafenstafel. On the 24th the Gers. made another gas attack and St. Julien was abandoned. But reinforcements were on the way, and Fr. regulars recaptured Lizerne and Het Sas and secured the W. bank of the canal against a further Ger. advance; while, on the 29th, the Canadians, who had saved the position at considerable loss, were relieved by British troops. Fighting continued for a considerable time longer and it became necessary to shorten the Allied line, an operation which was safely effected on May 3 and 4. Heavy bombardments continued until the 24th, when a final gas attack by the Gers. concluded their main effort. Crude respirators had by this time been served out and the gas did less damage than on the earlier occasions. The result of this battle, although materially to the advantage of the Gers., had important benefits for the moral of the Allies in showing that the British troops could stand up with heroism to the torture of the gas attacks, while the Gers., having tried a new and hitherto generally condemned instrument of warfare, had failed to achieve any decisive results. The Ger. offensive around Ypres now slackened to meet Allied attacks which were beginning on the Ger. positions in front of

Lens and Lille. To protect Lens the Gers. had constructed massive fortifications at the foot of the south-western slope of the Vimy Ridge, which ran in front of Lens. These fortifications were known as the Labyrinth and the White Work. The Fr. had collected eleven hundred guns and an immense supply of munitions for the most concentrated bombardment so far made. The bombardment was successful in clearing the way for the infantry, who captured La Targette and the White Work and entered Neuville St. Vaast. Not until the 12th did they capture the summit of Notre Dame, and another fortnight elapsed before they secured the Souchez sugar refinery, while the Labyrinth still held out, and for two years more Vimy Ridge remained in Ger. hands. The Ger. lines had been broken, but once more the lesson was driven home that small local successes were of little value when the main line was still held. Two further Allied attempts during May met with similarly disappointing results, one on Fromelles and the other in front of Richebourg l'Avoué.

The Munitions Question in Great Britain.—It was clear that much greater successes were needed to divert the Ger. troops which were reinforcing the Eastern Front. The situation led to political repercussions in Great Britain which must now be considered. A popular outcry arose over the lack of munitions. On April 21 Mr. Lloyd George announced in the House of Commons that the British output of munitions had been so increased that all needs were now fully supplied; yet, in May, he was himself appointed Minister of Munitions to accelerate this output, which was then discovered to be dangerously short of requirements. The fact seems to have been that the gov. had been misled by some of their expert advisers; but lack of an adequate supply of shells was only one of the grave existing deficiencies. British military experts were still thinking in terms of the S. African War, where mobility rather than high explosive had been the guarantee of success, and only very gradually did the requirements of trench warfare become clear to any of the Allied commanders and advisers. When at length there was a truer appreciation of the numbers of men and guns required to break through the Ger. trenches and concrete defence works on the Western Front in the calculations of the Allied High Command, the Fr. were able to make good some of their deficiencies in munitions by

withdrawing naval men to work in the munition factories. This substitution was the more practicable because the British navy was covering the most vital points of the Fr. coasts, and the Fr. were also able to use some of their naval guns on land. But the British navy had too many and varied commitments to be able to adopt either of these two courses. The popular clamour for more munitions led to the reconstruction of Mr. Asquith's gov., and at the same time Lord Fisher (*q.v.*) resigned from the Admiralty. He had been at loggerheads with Mr. Winston Churchill over the Dardanelles expedition, and on his resignation, Mr. Asquith formed a Coalition Gov. in which were included the principal Conservative leaders, and one or two Labour leaders. Mr. Churchill left the Admiralty, and Lord Haldane (*q.v.*) was removed from the post of Lord Chancellor. As has been noted, Mr. Lloyd George had been appointed Minister of Munitions, and the general feeling was that if he could get the munition factories working at full capacity, success would attend the British arms. It was an illusion; for far more than munitions was required, the British army being still well below the strength needed to achieve final victory. It was not yet realised that the only way to thwart the Ger. effort was to organise the Allied countries with an equal measure of precision and determination. By the autumn of 1915 the relative strengths of the Gers. and Allies on the Western Front had become much less unfavourable to the Allies, largely on account of the withdrawal of Ger. troops to the E.; while the Allies had secured a still more marked superiority in guns and munitions, owing to the strenuous efforts made to accumulate these during the preceding summer.

Western Front in the Autumn of 1915.—It was this superiority which encouraged the Allies to undertake renewed offensives in Sept. The British had taken over some 30 m. of what had been the Fr. front and had now a million men in the field, while the Fr. had two millions. But the British front was not continuous. Plumer's 2nd and Haig's 1st Armies held the line from Ypres to the S. of La Bassée, but d'Urbal's 10th Fr. Army intervened between Haig and the new 3rd British Army stretching from Arras to the Somme. On the British front a secondary attack was planned, but the main attack was to take place in Champagne, with the intention of breaking the Ger. communications from E. to W.

along the Aisne. On Sept. 23 an intense bombardment was opened from La Bassée to Arras and in Champagne. The infantry attack followed on the 25th, when Langle de Cary's 4th Army advanced on a 15-m. front from Auberive to Massiges. The preliminary bombardment was effective, and the Fr. took most of the Ger. front-line trenches and some of their second line, capturing thousands of prisoners and scores of guns. But the second Fr. attack on the 29th was less successful; because it was obviously far more difficult to advance from the battered remains of the Ger. front line against second and third lines of strongly defended trenches practically undamaged by bombardment. On Oct. 6 the Fr. made a third attack, which captured the Butte de Tahure, commanding the Bazancourt-Challerange railway, which it had been hoped to break; but on Oct. 30 the Gers. recaptured this position, and the Fr. were left with the doubtful net advantage of an advance, at some points, of 2½ m., having inflicted, however, greater losses on the Gers. than they had themselves suffered. The attacks between Ypres and Arras produced approximately similar results. The Battle of Loos (*q.v.*) was the principal British effort. The advance on the 25th was nearly everywhere successful, owing to the destruction wrought by the preliminary bombardment. The Hohenzollern Redoubt (*q.v.*) was taken, the Lens-La Bassée road crossed and Haisnes and Hulluch reached. But further S. the 15th Division had a greater success in the capture of the village of Loos and of Hill 70 (*q.v.*). But gradually the British troops were driven back from Hill 70, and out of the Hohenzollern Redoubt. On the 27th the Guards restored the line to some extent and the British held Loos, but failed in their major object of securing Lens. The defect was partly due to the delay in the advance of d'Urbal's Fr. Army, which failed to make headway until the 26th, when they took Souchez together with most of Givenchy Wood and Thelus. On the 28th they made some progress up the slopes of the Vimy Ridge. Attacks and counter-attacks during Oct. led to little result and the line was gradually stabilised for the winter with but small changes to compensate for the cost of the great Allied offensives. In Dec. Sir John French was recalled. It was evident that a brilliant cavalry leader was not necessarily the best commander of a trench battle-line; yet the criticisms levelled against the Eng. Commander-in-Chief were largely unmerited; it was no more the fault of Sir John

French that the British had failed to advance than it was the fault of the Fr. generals that their troops had failed to make headway. Both were faced by armies and equipment greater than any in previous history, and it was now gradually being realised in all quarters that the War was to be one of attrition lasting over a great period.

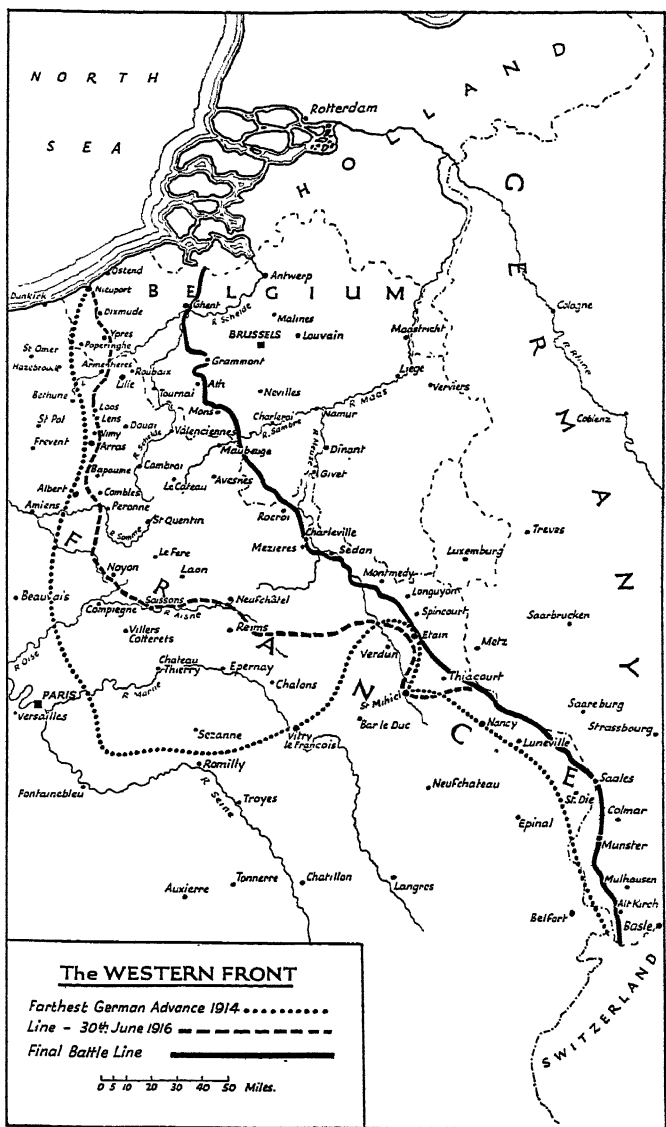
(x.) THE NEAR EAST, 1915-16.—*Gallipoli and the Dardanelles.*—It has been seen that the original naval attack on the Dardanelles had by the summer of 1915 been transformed into a land siege of the Gallipoli peninsula. During June heavy Turkish attacks with fresh troops were repulsed; but Sir Ian Hamilton could do no more than hold grimly the positions already occupied until the reinforcements for which he had repeatedly asked should be sent. By the end of July these reinforcements arrived. The submarine menace had sent the big ships of the British fleet back to home waters or to the protection of safe harbours, and during the summer only the destroyers, a few light cruisers and an occasional battleship were seen off the coast of Gallipoli. But in July a new type of monitor had been evolved with little exposure to submarine attack, and capable of throwing heavy shells 12 m. These were to take their share in the naval part of the new plan which had been decided on. This plan involved four separate actions. A feint was to be made at the head of the Gulf of Saros, as if to take in flank and rear the Turkish lines crossing the neck of the peninsula at Bulair. Next, a strong offensive was to be resumed by the troops in the Cape Helles region against their old objective, Achi Baba. It was hoped that these two movements would lead the Turks to send their reserves to Krithia, in front of Achi Baba in the toe of the peninsula. Meanwhile the Anzac Corps were to advance and to attempt to gain the heights of Koja Chemen; while to the left again a great new landing was to be made at Suvla Bay, just at the angle of the Gulf of Saros with the Aegean. It was believed that the Turks would be wholly unprepared for this landing, and, moreover, Suvla Bay had the advantage that it was sheltered from the prevailing winds and would afford a submarine base. If the force from Suvla could take the Anafarta Hills and so link up its right with the Australian forces, the British would hold the central crest of hills which run through the western end of the peninsula. Thus, if all went according to plan, they would be able to cut the communications of the

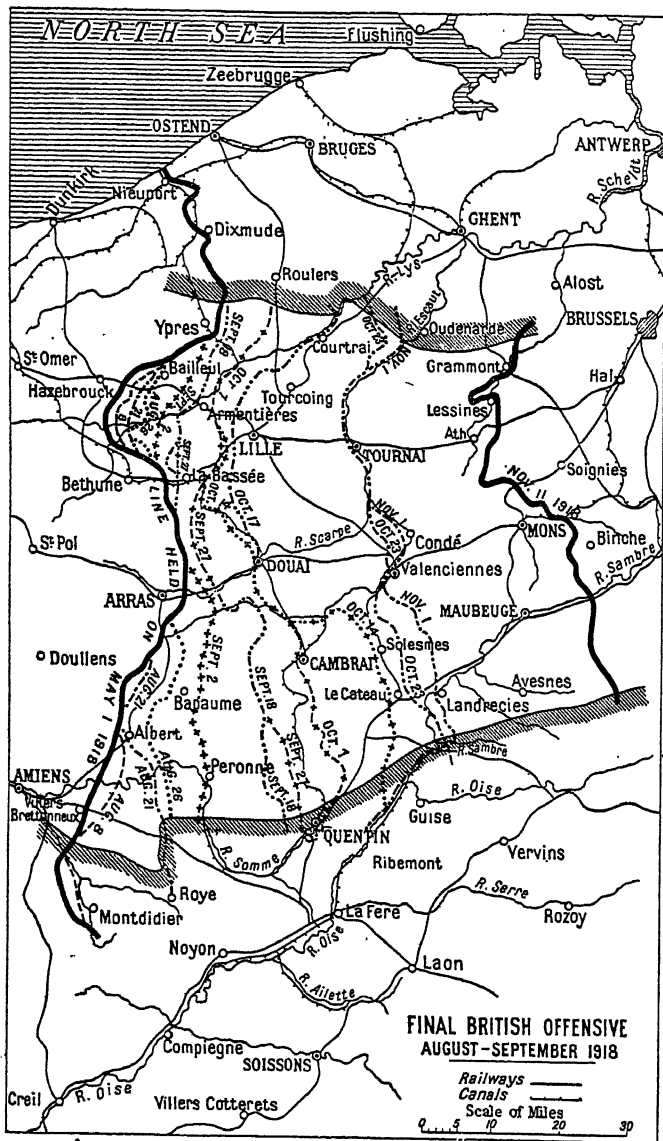
Turkish troops in the extreme end of the country, Achi Baba must fall and, after it, the great tableland of the Pasha Dagh, which commanded the Narrows. The preliminaries to the main assault began when the Allied forces at Cape Helles on Aug. 6 made a general attack on Achi Baba. Some advance was made, but on the following morning the Turks counter-attacked in force. They were repulsed, and an advance by the 125th and 129th British Brigades followed. For the next two days fighting continued, principally in the centre. This engagement was intended to distract the Turks and as such it may be considered to have succeeded. The operations undertaken by the Anzac Corps developed into the most desperate struggle which had so far taken place in Gallipoli. The Australians began the attack against the Lone Pine Plateau in the afternoon of the 6th, after the Cape Helles action had started. The Turkish trenches at this point were enormously strong and had been roofed with heavy timber as a protection against shrapnel. After a preliminary bombardment by the artillery and the ships' guns, the Australians ran across the open and reached the Turkish positions, where a desperate struggle began in which the Australians had no protection from the Turkish guns until they could penetrate the covered trenches. Finally, the Australians fought their way down into the trenches, where hand-to-hand fighting won the first line in a quarter of an hour, and before night the whole Lone Pine position had been won. For the next few days the Australians had to fight to maintain their ground, and this more difficult but less spectacular operation was carried out with conspicuous gallantry. In this action alone the Turkish losses were estimated at 5000 men. The effect of the action was auspicious, for it drew all the local reserves to meet it. The gallantry of the Australians cannot be over-praised, for in Sir Ian Hamilton's words, 'One weak Australian brigade, numbering at the outset but two thousand rifles and supported only by two weak battalions, carried the work under the eyes of a whole enemy division, and maintained their grip on it like a vice during six successive days' counter-attacks.' Meantime the Anzac left wing began to move during the night of the 6th, and the preparatory movements were tolerably successful. The main operation, begun at dawn on the 7th, took place in severe heat, and the troops had already been all night on the road; but at first

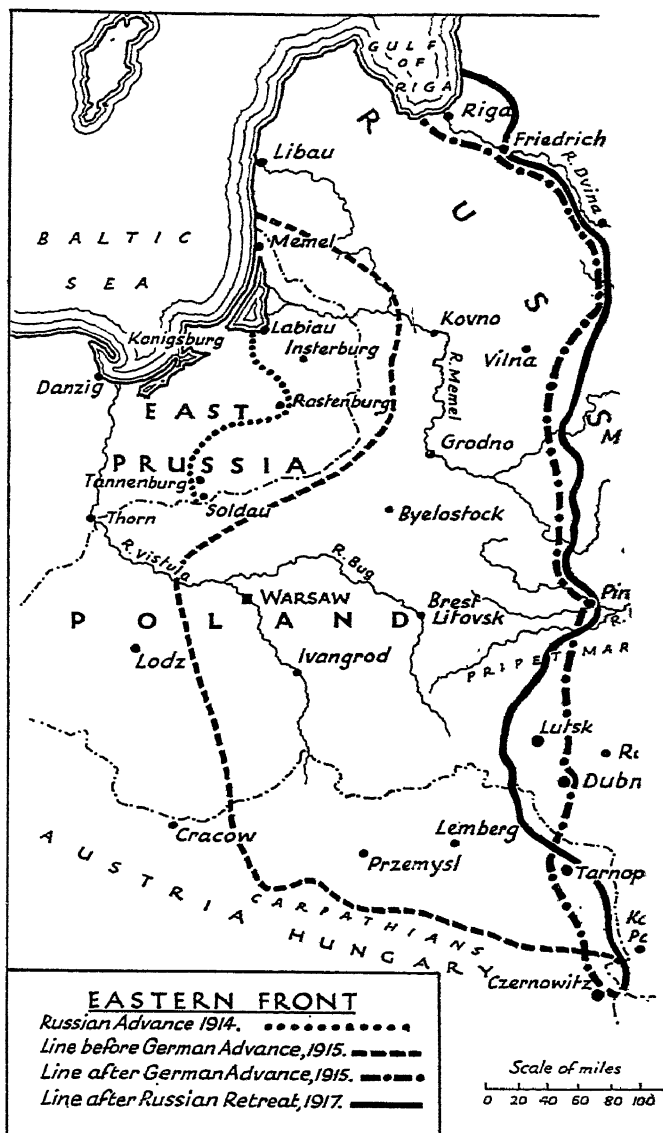
the New Zealanders made good progress and carried Rhododendron Ridge to the W. of Sari Bair; but the Indian and Australian troops on their left were held up in the difficult country. At dawn on the 8th the New Zealanders again attacked and carried the crest of Chunuk Bair from which they could just see the Dardanelles. Their losses were very heavy. Through the great heat no movement could be long sustained, and water could only be brought up with much difficulty from the beaches. On the 9th the Indians for a brief period held the summit of Hill Q., and looked down on the eastern slopes, but they were driven back, because the troops landed at Suva had been unable to make contact with them. On the 10th the Turks counter-attacked on Chunuk Bair and drove the British forces some distance from the ridge, but were there held. The landing at Suva Bay had taken place on the 7th with the support of monitors in the bay, but little advance was made that day, partly on account of lack of water for the weary troops. On the 8th the real advance should have been made; but for reasons partly connected with the rawness of the troops, which consisted of men of the new army with little experience of fighting, and partly on account of lack of driving power in leadership, only sporadic advances took place, and by the 9th it was too late, for the Turks had already moved reinforcements to the area. For the next ten days no further advance took place, and the British prepared for a new landing at Suva, for which the 29th Division was transported in trawlers from Cape Helles. The attack began on the 21st; but it could hardly have succeeded, for the Turks were fully prepared and all previous frontal assaults had failed in the Cape Helles area. The Aug. fighting was the most costly part of the Dardanelles campaign. For the first three weeks of the month the British casualties were approximately 40,000, and the sole result was to extend the length of the British battle-front by 6 m. and to advance it on the left by a mile or two. After the end of Aug. the two exhausted armies abandoned further hope of advance. (*See also GALLIOLI CAMPAIGN.*)

Allied Diplomacy and the Balkan States.—During the spring and summer Allied diplomacy had been concentrating on the complicated problem presented by the Balkan States. They had attempted to revive the Balkan League, which had so effectually routed Turkey in the Balkan War of 1912, only to dissolve in the Second Balkan War of 1913,

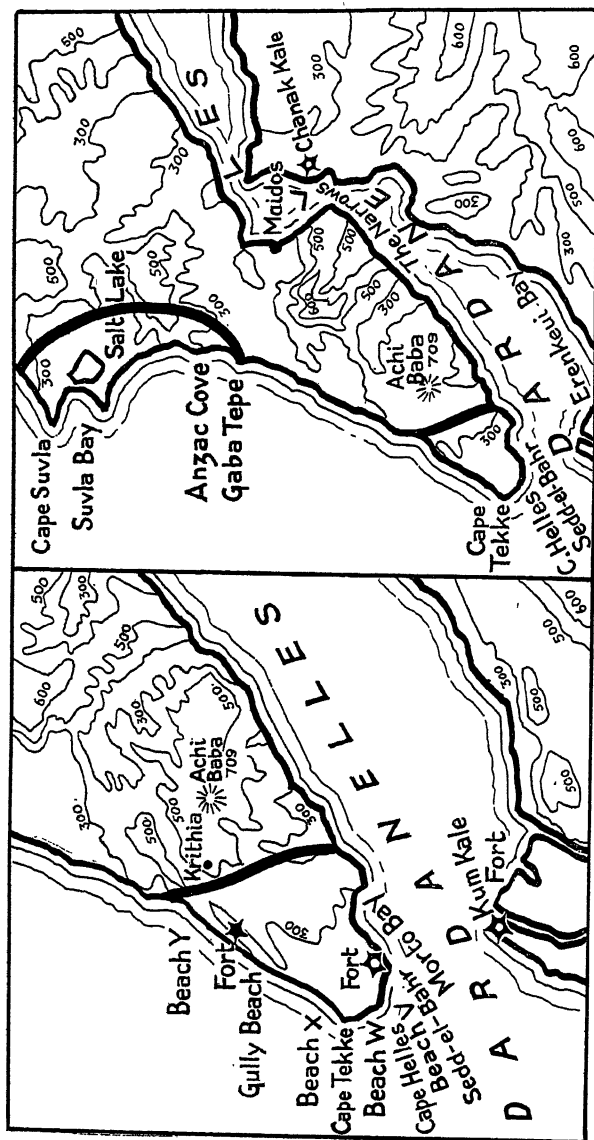
when the victors quarrelled among themselves. As a result of the second war, Bulgaria found that she was losing all that she had gained in the Turkish War and more besides, while her former allies, Greece, Serbia, and Rumania, had each taken a section of territory inhabited by people of Bulgar race (*see BULGARIA*). Ferdinand, king of Bulgaria, was determined to retrieve his mistake in the last Balkan War by supporting whichever side was likely to give Bulgaria the greater advantages. As the price of Bulgaria's assistance to either side he asked the return to her of the territory seized by the other Balkan States. A Bourbon on his mother's side and a member of the House of Saxe-Coburg-Gotha on his father's, his preferences were probably in favour of the Central Empires; but his country, in the main, still retained the traditional Slav regard for Russia as the natural protector of the Slav races. Instead of concentrating on Greece and Rumania, which they were in a position forcibly to influence, the Allies directed their diplomacy mainly to an attempt to secure the support of Bulgaria; but as they could satisfy Bulgarian demands only at the expense of the Serbs, who were already their allies, and the Rumanians and Gks., whom they hoped to make their allies, their promises were but half-hearted. Germany had no such difficulties. She offered Bulgaria Serbian Macedonia, Salonika, and also the Epirus, Gk. territory which had never before been mentioned in Bulgarian claims. This offer was finally embodied in a secret treaty signed on July 17, 1916, between Bulgaria, Germany, Austria, and Turkey. Thus the Entente diplomacy had failed to secure the help of Bulgaria, and had indeed resulted only in aggravating the Allies' difficulties with other Balkan States, and particularly with Greece, where M. Venizelos, the pro-Entente Premier, was continually in conflict with King Constantine. Early in the War, M. Venizelos had offered the support of Greece to the Entente and early in 1915 he addressed a letter to King Constantine in which he emphasised the need to secure the Gk. position from an Austro-Ger. attack which might follow the defeat of Serbia. He urged the conclusion of an alliance with Rumania and also, if possible, with Bulgaria, and the insistence by Greece on concessions from the Allies which should ensure the establishment of a strong Hellenic power after the War. But apart from the Prussian influences at the Gk. court—King Constantine's wife was the sister of the Kaiser—the failure of the Dardanelles expedition





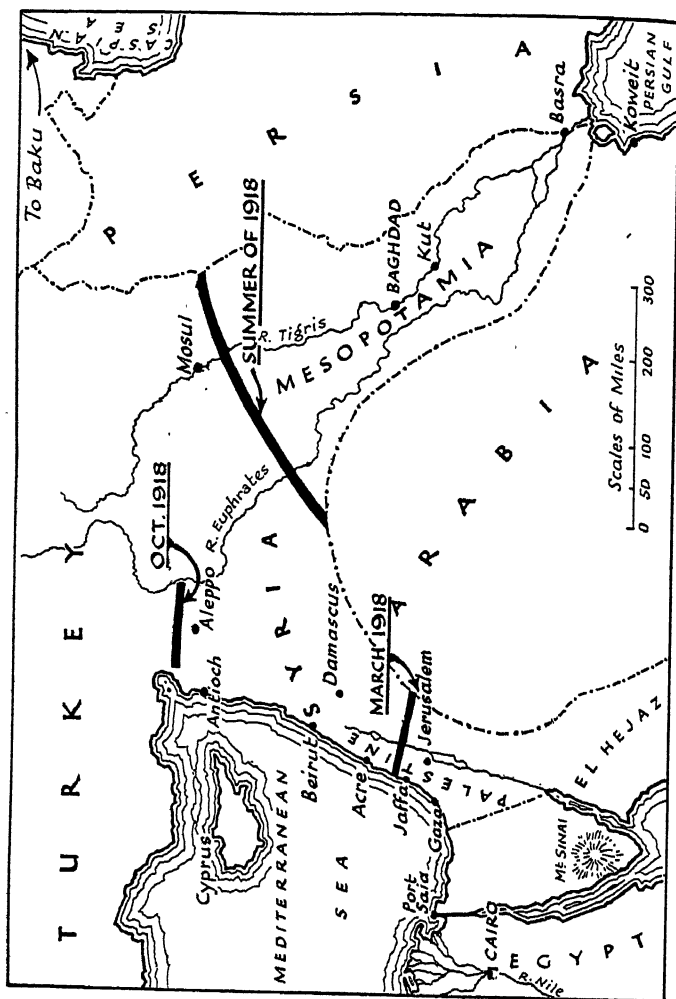






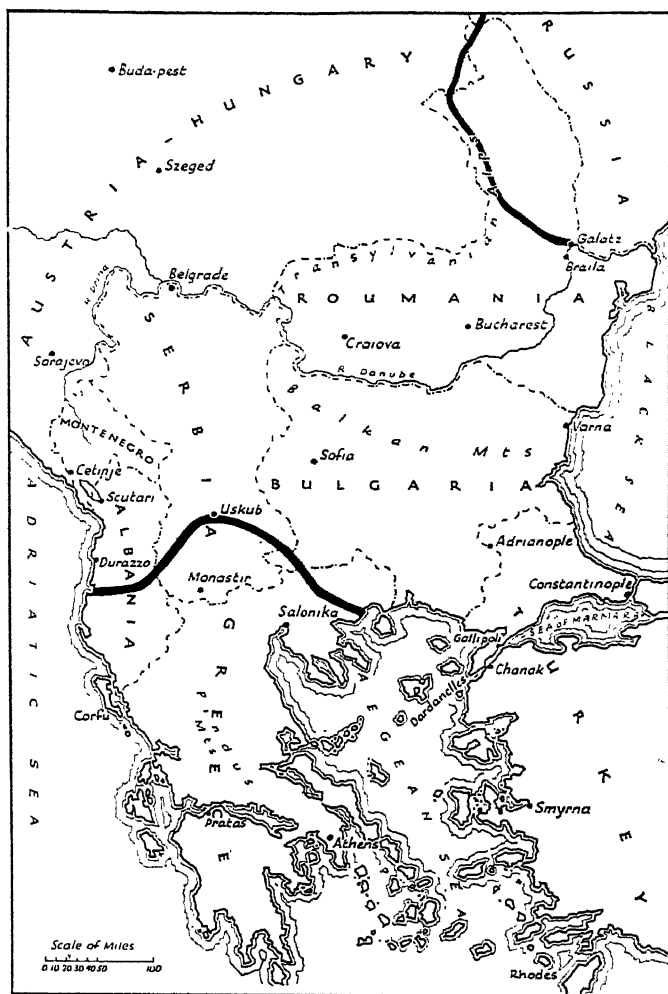
GALLIPOLI AND THE DARDANELLES

The map on the right shows the three main theatres of operations: Suvla Bay, Anzac Cove, and Cape Helles, while on the left is a more detailed map of the Cape Helles area with the well-known names of the places where landings were effected. The black lines show the final positions of the Allies' troops before the evacuation.



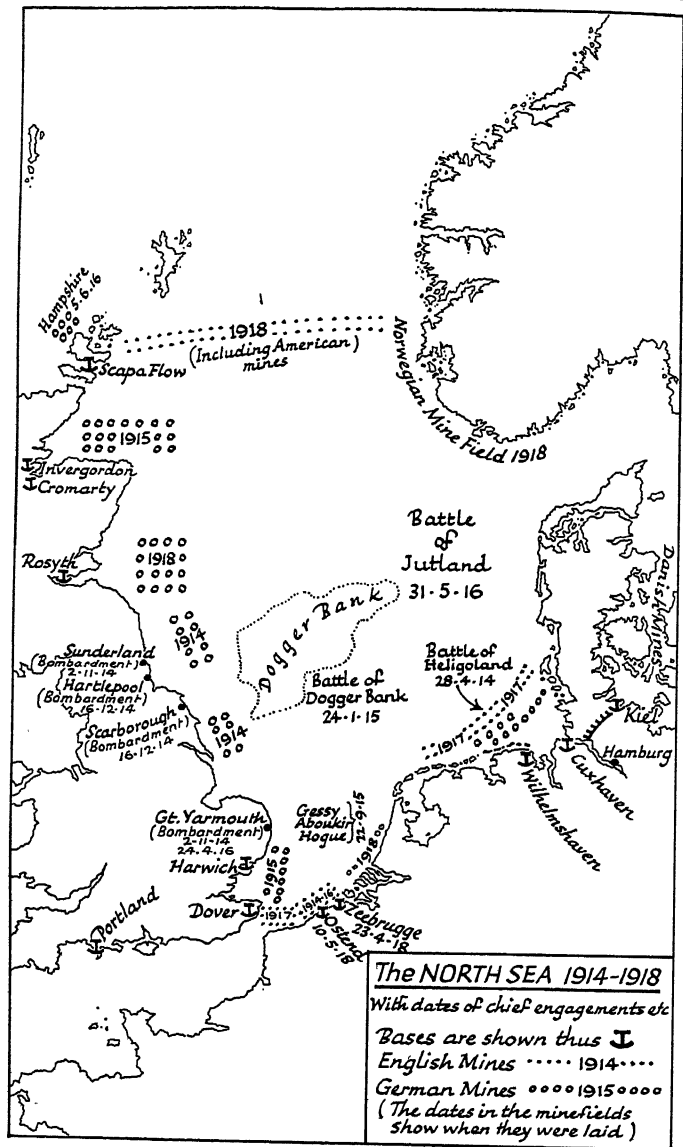
THE CAMPAIGNS IN PALESTINE, SYRIA, AND MESOPOTAMIA

The lines show Allenby's progress in Palestine and Syria, and the position of Marshall's troops in Mesopotamia.



THE BALKANS

To the north is the Russo-Rumanian line at the collapse of Russia, and to the south the Macedonian line on the signing of the armistice in September, 1918, with Bulgaria.



up to the summer of 1915, and the advance of Mackensen in Galicia had an unfavourable effect on the Gk. General Staff. The Gers. seized the opportunity presented to them by the stalemate on the Western Front and their successes in Galicia to undertake a campaign to secure the Balkans and bring in the waverers on their side. Bulgaria being now secretly committed to them, they could hope to control the railway to Constantinople by a successful Balkan campaign, and so bring much needed munitions to Turkey and food and other supplies to Germany. Ger. diplomacy appreciated, too, that British fears for India and Egypt would be increased by a Ger. success in the Balkans, and that these fears might induce the British to divert to the Balkans troops needed on the Western Front. Mackensen, the victor in Galicia, was selected to lead the Balkan campaign, and during Aug. the concentration of troops began. On Sept. 19 Mackensen's combined Ger. and Austrian forces opened fire on Belgrade. At first he made little progress and attention was concentrated on Bulgarian intentions. Suspicion of some secret agreement was growing among Entente diplomatists; it was not forgotten that a further payment of a loan raised by Bulgaria with a Berlin bank had been made in the spring, and it was naturally supposed that this payment would not have been made by the Gers. without securing some advantages for themselves. During Aug. and Sept. this suspicion grew, for Ger. agents were welcomed in Sofia and General Liman von Sanders paid a visit from Constantinople. But the Entente still refused to believe their own advisers and continued up to the last possible moment to play for Bulgarian neutrality, and even refused to allow Serbia to undertake an aggressive movement against Bulgaria which might have altered the course of events. M. Venizelos was not deceived, and on Sept. 21, after the Ger. attack on Serbia had begun, he asked France and Britain to send 150,000 troops to Salonika.

Allied Expedition to Salonika and Ger. Invasion of Serbia.—That day the first steps for Bulgaria's mobilisation were taken, although the official order was dated two days later. On the 24th France and Britain agreed to M. Venizelos' request, and on the same day Greece began to mobilise. On the 25th Bulgaria explained her mobilisation as merely armed neutrality to defend her own interests; but on the same evening news came that Bulgarian cavalry was massing on the Serbian

frontier. Rumania, already mobilised, announced that she would as yet take no decisive step. Protests by the opposition leaders in Bulgaria were ignored by King Ferdinand. Serbia's announcement on Sept. 27 that she intended to attack Bulgaria was, as has been seen, discouraged by Britain. On Sept. 28 M. Venizelos secured the support of the Opposition in the Gk. parliament to his War Credits Bill, and on Oct. 5 Russia broke off relations with Bulgaria, to be followed by Britain and France. Meanwhile the Allied troops were arriving at Salonika, and by Oct. 7 two divisions were on shore. On Oct. 4 M. Venizelos had announced that Greece must go to war without waiting for a formal declaration by the Central Powers; but the next morning King Constantine told him that his policy had not the royal sanction and he resigned. M. Zaimis became Premier, and announced that Greece would retain an armed neutrality benevolent towards the Entente. Mackensen now moved swiftly. On Oct. 9 Belgrade was captured. On the 11th Bulgarian troops crossed the Serbian frontier and on the 12th Bulgaria declared war on Serbia. On the 15th Britain declared war on Bulgaria. The Allies had only some 13,000 troops at Salonika, and there was no hope of Rumania coming in on the Allied side unless Russia could make a diversion in Bessarabia. The troops at Salonika could hope to do little more than harass the edge of the Bulgarian advance into Serbia. Serbia faced the new invasion with an army reduced by the losses of 1914 to not more than 200,000. Her internal condition was completely disorganised by repeated invasions and her people were suffering from disease and famine. But if Mackensen had been the only enemy she could have hoped to retire again to the hills and keep in touch with the Allied base at Salonika. The intervention of Bulgaria on the eastern flank completely altered the situation. The only hope for Serbia was that the Allies at Salonika might be able to turn the Bulgarian flank. All the main Serbian armies were on the northern front, and there was therefore nothing to stop the Bulgarian advance on Uskub, which was in fact occupied on Oct. 22. By the 26th the Gers. had secured the Danubian route to Constantinople, and the Austrian and Bulgarian forces had been united. Kragujevat, the main Serbian arsenal, fell on Oct. 30, and Nish, the anct. cap., on Nov. 6 after three days of severe fighting. The northern armies of Serbia were now in full retreat towards the western hills,

and the small forces in the S. fought a desperate battle in the attempt to hold up the Bulgarian advance from Uskub towards Pristina and Monastir. They held the Katchanik Pass for several days at the end of Oct., a resistance which gave Marshal Putnik's northern armies the respite needed to complete their retirement to the hills. At the Babuna Pass another gallant attempt was made to prevent the Bulgarians reaching Monastir; but the Allies were unable to advance, and the Serbians had to fall back after a week to the Albanian borders. General Sarrail (*q.v.*), with the Fr. force which had landed first at Salonika, advanced up the railway line towards Mitrovitza as far as Krivolak, while the British were on the Fr. right towards Lake Doiran. The Fr. succeeded in crossing the Vardar R. and occupying the heights opposite Krivolak, but were compelled to fall back from an advanced position across the Tohera into an entrenched camp they had prepared around Kavadar. The Allies had failed to bring help to Serbia while involving their own forces in extreme difficulty; whereas the Serbians, if left to their own resources, might possibly have offered a better defence against the Bulgarians. After the capture of Nish, Mackensen, having secured the route to Constantinople, left the advance mainly to the Bulgarians, on whom he relied to complete the rout of the Serbian remnants, who were now struggling through the passes to the Albanian coast. The retreat was made through mountain passes under snow and only the heroic endurance of the Serbians made it possible for as many as 130,000 troops to reach the Adriatic coast, hampered as they were with civilian refugees, including women and children. With great difficulty food was sent to the Serbians at the various points where they reached the coast, and Italian troops arrived at Durazzo on Dec. 21 to provide a rallying point for the Serbian army. Meanwhile Monastir had been evacuated on Dec. 5, and Sarrail was compelled to withdraw his army, while the British, who had been engaged in hard fighting with the Bulgarians around Lake Doiran, were compelled to retire some distance. By Dec. 12 the Allies had withdrawn within the Gk. frontier, without serious losses of men or material, and took up a strong position about 30 m. from Salonika. Although the purpose of the Salonika landing had failed, the Allies were determined to hold it, because it would have made a formidable base if occupied by the Central Powers. Accordingly steps were taken to fortify the

lines across the whole peninsula of Chalcidice, and by Christmas the position was completely defended. Austria had now undertaken the conquest of the little kingdom of Montenegro, left undefended by the Serbian disaster. Mount Lövtchen, the fortified mountain defending the cap., Cetinje (*q.v.*), held out for a month both against bombardment from the sea by naval guns and against land attack, but fell finally on Jan. 10. Three days later the Austrians entered Cetinje. Austria announced the unconditional surrender of Montenegro, but it was soon found that there had been no surrender and that the Montenegrin army was retreating towards Scutari, while King Nicholas of Montenegro had fled to France. On Jan. 23 the Austrians occupied Scutari, and moved S. against the Italians at Durazzo. In Salonika the Allied troops settled down to a long period of inaction, because the position was too strong to be attacked and they were in no condition for an offensive. The Austrians captured Durazzo on Feb. 27, and the loss to the Allies of this port made it necessary to find some base for refitment inaccessible to the enemy. Fr. and Italian troops were landed at Corfu, and the Serbian army was able to use it as a rest camp. Some 100,000 Serbs were assembled at Corfu and most of them were later transferred to Salonika.

Evacuation of Gallipoli and its Repercussion in Mesopotamia.—Meanwhile the Gallipoli campaign (*q.v.*) had come to a standstill. Towards the end of Nov. it became clear that new munitions were beginning to reach the Turks. The batteries on the Asiatic shore became active against the Cape Helles beaches, and on Nov. 27 a snow blizzard following heavy rain storms added disease to the other difficulties of the Allied troops. Over ten thousand sick had to be evacuated as a consequence. The heavy losses during the seven months of the expedition, coupled with the doubt whether supplies by sea could be maintained in the winter storms, decided the Allies to undertake the difficult task of evacuating Gallipoli. Gradually the guns and the less fit troops were removed by night, although a feint of the usual activity was made during the day. The final embarkations from Suvla and Anzac took place on the nights of Dec. 18 and 19, and early on the morning of the 20th the last troops from these areas began to embark. The evacuation of these positions was complete by 9 o'clock that morning without a single casualty, an extraordinarily fine achievement of organisation.

The evacuation of Cape Helles was still more difficult and had to be delayed; but the last troops were evacuated on Jan. 8, again without casualties, although in the actions which had been necessary to prepare the way for this final evacuation some lives had been lost. Thus ended the Gallipoli adventure, with an achievement of really remarkable military skill, by which three corps were removed safely to take a very effective part in other theatres of war. Their preoccupation with Gallipoli ended, the Turks were now free to turn their attention to other areas, one of which was Mesopotamia. Early in the War British and Indian troops had been landed at the head of the Persian Gulf with the object of defending India and of preventing the well-known Ger. plan of developing Mesopotamia. Before the War, Germany had financed the Baghdad railway (*q.v.*), and had also made various attempts, under the guise of trading enterprises, to establish a footing on the Persian Gulf. A force from India had captured Basra at the junction of the Tigris and Euphrates in November 1914. Early in Dec., the Turks collected troops at Kurna, 50 m. up the Tigris at the junction with the old channel of the Euphrates. A British force accordingly advanced to that place, but had to wait for reinforcements before obtaining the surrender of the Turkish garrison on Dec. 9. The British had now obtained control of the whole of the delta and prepared entrenched camps on either side of the Tigris, at Kurna and Mezera, to secure their position. At the beginning of 1915 further reinforcements were brought from India under Sir John Nixon, who, on arrival, took supreme command of the operations. During April, the Turks attacked the British positions in force, but were beaten off with heavy loss. Towards the end of May the Turks attacked again and it was decided to drive them N. The important military post of Amara, 75 m. N. of Kurna, was captured on June 3. The British advance continued in spite of a desire to limit the operations, largely because each advance made necessary some further operation to secure the position reached. Thus the British hold on Amara was precarious so long as they did not hold Nasiriyeh on the Euphrates. A British force from Kurna made a difficult march through the floods and captured Nasiriyeh on July 25, with large stores of ammunition. By this time the larger project of an attack

on Baghdad itself was being developed, and an advance to Kut al Amara (*q.v.*) was decided upon. General Townshend's Division was chosen to make the advance. The Turks were strongly entrenched some 7 m. downstream from Kut; but by a flanking movement the British succeeded in turning the Turkish position and, by the 29th, the Turks were in retreat towards Baghdad and the British entered Kut al Amara. In view of the fact that the Turkish positions had been heavily entrenched this success seemed auspicious, and, thus far, the Mesopotamian campaign had been well conducted and successful. By the end of Sept., Townshend was only some 200 m. by riv. and 100 m. by land from Baghdad, with easy country before him and the winter climate which was favourable to campaigning. But he had little more than a division, he was well over 300 m. from his base on the sea, and had a difficult riv. full of shoals and banks as his sole means of communication. The Turks, on the other hand, could be readily reinforced and had every advantage of communications, while Baghdad itself was an open city difficult to defend against superior forces. But the capture of the city would have political effects of great importance, which doubtless weighed with the Allies as a balance against reverses sustained on other fronts. General Townshend protested against the advance but was overruled. The advance continued. By Oct. 23 most of the force had reached Azizle, more than half-way to Baghdad, where they were opposed by some 4000 Turks, whom they routed by a flank attack. On Nov. 22 the British troops reached the Turkish prepared position in the ruins of the anct. city of Ctesiphon (*q.v.*). The battle continued until the 24th, but the inadequate forces of the British could not pierce the strong Turkish positions. The British casualties were about a third of their whole force, and although the Turkish casualties were estimated at 10,000, the Turks were continually reinforced while the British could not hope to be. Accordingly at midnight on the 25th the British marched back to Lajj, whence they had set out the day before the battle. On the evening of the 26th the retreat continued to Azizle. The Turks had, however, been too severely battered to pursue quickly, and it was not until they were 10 m. beyond Azizle that the British were again attacked. On Dec. 3 the remnant of the British force reached Kut, and the historic siege of that tn. began. Meanwhile, in Northern Persia things were going

badly for the Allies, for the Ger. Minister, Prince Reuss, had won over some of the Persian Ministers, many local tribes, and the whole of the gendarmerie, officered by Swedes. The British retirement from Ctesiphon and the Russian standstill in the Caucasus brought matters to a head. In the second week of Nov. a detachment of the Russian army of the Caucasus moved on Teheran. Prince Reuss replied by seizing key positions to the S., but the Russians drove him out of them, and restored a pro-Ally gov. in Persia. Even so the whole of Persia was in a ferment and strong bands of rebels were in touch with the Turkish army of Mesopotamia. Townshend in Kut had approximately ten thousand men. The position of the tn., inside a loop of the Tigris, with an opening by land, strongly entrenched, towards the N., was a strong one for defence; but, while the place could easily be defended against direct assault, the task of supplying for any length of time ten thousand men in the narrow loop was difficult. At first no difficulty was anticipated as regards relief, and all that General Townshend expected to have to do was to hold out for a couple of months until the relief force could ascend the riv. and drive off the Turks. By Dec. 5 the siege began in earnest. Four Turkish divisions lay around the tn., and on the 7th the Turkish commander, Nur-ed-Din, called upon the garrison to surrender. On Townshend's refusal he opened a heavy bombardment. Fighting continued for some days without serious losses to the British, and a lull then followed until the 23rd, when a new division arrived from Gallipoli and the Turks made a more determined assault. The assault continued until the 29th, but failed to penetrate the defences, and the Turks settled down to a blockade. Meanwhile the relief force began to move; but great difficulties of transport up the treacherous riv. were experienced, especially in view of the strength of Nur-ed-Din's fortifications. Successive attacks were continued by the relieving force until April, when the great floods made further movement almost impossible. Meanwhile the position of the garrison in Kut was growing desperate. Immediately before their entry into Kut, they had fought an arduous campaign on meagre rations, and, during Dec., they had been bombarded repeatedly and had repulsed many attacks. There were many wounded and much sickness; but the greatest danger was famine. During the spring the rations were gradually reduced and with the

failure of the relieving force to penetrate the Turkish defences at the beginning of April the end of the resistance was in sight. General Gorringe, now commanding the relief force, made a last effort to get supplies to the garrison on April 24, when he sent a riv. steamer to try to break the blockade; but the boat went ashore 4 m. below the tn. On April 29 General Townshend surrendered (*see* KUT). His garrison had been reduced to 2000 British troops and some 6000 Indians. The Turks treated their captives abominably, forcing them to find their way, as best they could, to prison camps in Northern Mesopotamia and Asia Minor. Robbed by Arabs, and uncared for, the great majority perished on the road. Townshend and his staff were taken to Constantinople. The campaign had ended in disaster; but it had served a useful purpose in holding Turkish troops who would otherwise have been available in the Caucasus, where, as will be seen, the Russians had made a remarkable advance. After the fall of Kut very serious errors on the part of the Indian military authorities came to light. No adequate provision had been made for riv. transport, and there was a most serious lack of proper medical and sanitary equipment. Until Feb. 1916 no special hospital boat had been provided to take the wounded down riv. from the fighting line, although well-equipped hospital ships were running from Basra to India. There was also no proper transport for wounded from the field to the riv., but only springless carts; while, on the riv., the wounded had to lie on decks sodden with dirt. The Kut disaster being evidently the sequel to gross inefficiency in the Indian army system, as well as errors of strategy, a commission of inquiry was set up.

The Russian Campaign in the Caucasus.—The Turkish preoccupation with Mesopotamia had weakened their forces in Asia Minor, and the Grand Duke Nicholas, now commanding in the Caucasus, took advantage of this weakness to begin a new campaign. His first objective was the great fortress of Erzerum, before the War reckoned as the most formidable in the Turkish Empire. From the Turkish side communications with the city were very difficult. From Trebizond on the Black Sea there ran a good road; but the tn. was useless to the Turks as a base for supplies since they had lost to Russia the command of that part of the Black Sea. Up to the end of Feb. 1916 the Russian light cruisers and torpedo boats had sunk some

4000 Turkish vessels. All supplies for Erzerum therefore had to be sent by the difficult land route from Angora, to which place ran a single-line railway. For the Russians advancing from Transcaucasia the route was much easier because they had a railroad at Sarikamish on the line from Tiflis only 80 m. from Erzerum, and though those 80 m. of road from the railroad lay over high mountain passes, in winter choked with snow, the Turks had to contend with climatic difficulties almost as great. The Grand Duke Nicholas had been preparing for an offensive for some time; but it is probable that he would not have embarked upon it until the early spring if the departure of the last Allied troops from Gallipoli early in Jan. had not released a large number of Turkish troops, some of whom would be sent to the Caucasian front. Realising that six weeks must elapse before these reinforcements could be transferred to that front, the Grand Duke decided to attack before they could arrive. The immediate commander of the attacking forces, General Yudenitch, began his advance on a wide front to avoid having his flank turned by the considerable Turkish forces which stretched northwards from Lake Van to the Black Sea. He planned to attack Erzerum by three columns converging on the city. The preparations for the advance were entirely unknown to the Turks, since the Grand Duke had been able to collect his forces across the Black Sea without a possibility of the Turks discovering the movements. On Jan. 11 Yudenitch's right wing drove back the enemy upon Lake Tortum, and then moved over the mountain passes and encircled the Turkish left, so that it was compelled to fall back towards Erzerum to avoid being cut off. His left followed similar tactics, and the centre made good progress to the village of Kuprikeui, which commands the bridge over the R. Araxes. Here a fierce battle took place from Jan. 16 to 18 when the Russians forced the bridge in a snowstorm and took the village, driving the Turks back on the road to Erzerum. Yudenitch was now only a little over 30 m. from the city, and his wings continued to drive back the Turks, his left forcing back the Turkish right towards Mush, and his right having completely separated one division from the main force and driven the rest back in disorder with the loss of several thousand prisoners. On Jan. 19, Yudenitch reached the strong Turkish position of Hassan Kaleh, which it was believed would be held in force; but the Turks had

suffered so severely at Kuprikeui that they fought only a rearguard action, and again retreated behind the great horseshoe line of hills, the Deve Boyun, which formed the immediate defence of Erzerum on the E. Meanwhile the Russian Black Sea fleet was destroying the Turkish transports, many laden with food for Erzerum. Erzerum was now in a hopeless condition. The Turkish army was demoralised by the rapidity of the Russian advance, and by the severe weather in which they had had to make hasty retreat. From Jan. 26 to Feb. 12 the Russians were compelled to call a halt to bring up their heavy guns and ammunition and organise their transport lines over the snow-covered mountain roads, but they kept up a steady bombardment of the Deve Boyun Ridge with field guns and their smaller howitzers and so prevented the Turks from improving the defences. On Feb. 10 the right column coming down the valley of the Western Euphrates through deep snow and some fifty degrees of frost reached the fort of Kara Gubek, which was at the extreme N.E. point of the defences of Erzerum. This fort fell on the 12th, and next day the Russians carried Fort Tafta, some 5 m. further along the valley, which gave them a position in the rear of the main defences on Deve Boyun. During the next two days the Russian centre continued to attack the forts on Deve Boyun, which surrendered one after another. Meanwhile the southern Russian column was forcing its way through the passes of the Palantuken range to the S.E. of the city, and by the evening of the 15th they had carried the position, and the sole defence left to Erzerum was the old ramparts and neglected inner redoubts. The evacuation of the city began, and on the 16th the Russians entered it. They captured some thirteen thousand Turks, over three hundred guns, and large stores of ammunition and war material. In the whole of the Russian advance some five Turkish divisions were completely destroyed. The conquest of Erzerum was one of the most brilliant performances of the whole War. Yudenitch's plan depended on exact timing of the three separate but converging movements, and the conditions under which the movements were undertaken were of the worst for such precise calculation. So far the Russian advance had produced useful effects in a crushing blow at the Turkish forces; but the capture of Erzerum itself was not of great value without that of Trebizond and of

Erzingan, which stood at the opening into the rich plain of Anatolia, from which Turkey drew her main supplies of food. The Turkish troops released from Gallipoli were coming up before Yudenitch could advance much further and it was necessary to continue the advance with caution. The main line of the Turkish retreat, down the Kara Su or Western Euphrates to Erzingan, was through very difficult mountain country with many defensible positions. Yudenitch in his advance on Trebizond had to keep a wide front in order to cover all routes by which the Turks might attempt a flanking movement. Trebizond had been of little use to the Turks since the Russians had secured control of the Black Sea; but to the Russians its value was very great, since it was not only the best harbour on the coast but the centre from which radiated all the chief roads in that part of Asia Minor. Its capture would give a new base for the Russian army, and would greatly shorten the lines of communication. Some of the forces advanced on Trebizond from Erzerum and some from Batum; but the roads were so difficult that the greater part were brought by sea and landed at Atina, some 60 m. E. of Trebizond, on March 4. By April 6 the Russians had at length reached the main line of the Trebizond defence, a stream called the Kara Dere. On the morning of the 18th, Trebizond fell, the garrison retreating southward in the direction of Baiburt. Thus, again the Russian plans were successful, and the possession of the grain lands of Turkey seemed nearer. The Russian left wing had occupied both Mush and Bitlis and was moving on Diarbekr. By the end of May the Russians were close to Baiburt and had occupied Mamakhatur, half-way between Erzerum and Erzingan; but on May 31 a strong Turkish offensive began in these regions. The reinforcements from Gallipoli and Mesopotamia were beginning to make themselves felt. The Russians were forced to evacuate Mamakhatur. There ensued a month's lull, and then on July 12 the Russians recaptured Mamakhatur; on the 15th they took Baiburt and drove the Turks back from their position S.W. of Mush; and by the 25th their cavalry had occupied Erzingan, the most important gain since the fall of Trebizond. Early in Aug., however, the Turks took both Mush and Bitlis and drove back the Russians some 30 m. There was grave danger that the Russian front might be broken and the two halves driven to the Black Sea and to

Lake Van. At the same time the extreme right of the Turkish line attacked towards Rayat. On Aug. 18 the Russians began their counter-attack, and near Rayat on the 25th they dispersed the 4th Turkish Division and took two whole regiments captive. They had already retaken Bitlis and they recaptured Mush on the same day as the Rayat battle. Yudenitch thus broke the threat to his communications and was free to resume his slow progress towards Anatolia.

The Arab Revolt.—Meanwhile in Persia during the spring and summer the Russians had been conducting a campaign with a small force under General Baratov, which had been sent in Dec. 1915 to counteract the effects of Ger. propaganda there. The Persian gendarmerie under Swedish officers had been encouraged by Prince Reuss, the Ger. Minister to Teheran, to rebel against the pro-Entente gov. Risings took place in various places and British civilians at Yezd and Shiraz were taken prisoner, while in Teheran itself the Ger., Austrian and Turkish Ministers, on the approach of the Russian force, endeavoured to persuade the Shah to leave the city with them, but his advisers resisted. Prince Reuss collected a total force of some 15,000 and endeavoured to hold certain important points at Kum, a telegraph junction on the road to Ispahan, and at Hamadan on the Bagdad road. Swiftly the Russians attacked these positions and drove the rebels to the hills on the border of Mesopotamia, where they kept in touch with the Turkish army. In March Sir Percy Sykes arrived at Bundar Abbas and proceeded to organise a military police for Southern Persia. Baratov continued to advance and reached the frontier of Mesopotamia in May; but in June Turkish reinforcements attacked him and drove him back finally even from Hamadan, while sporadic revolts began in Persia. Meanwhile, another event occurred which considerably upset Turkish calculations. This was the revolt of the Arabs in the Hejaz (*q.v.*). The orthodox Moslems of the regions around the Holy Cities of Mecca and Medina had never completely accepted the suzerainty of the Sultans of Turkey, but had been content to give Turkey general support as the strongest Moslem Power. With the advent of the new rulers of Turkey came a cynical disregard of orthodox traditions and subservience to Germany, and the Arab leaders began to feel more sympathy with the Entente, for it was palpable enough that large numbers of Moslems were living under

the British and Fr. flags with complete freedom of religious practices. The Grand Sherif of Mecca was the most powerful chief of the Arabs in Western and Central Arabia, and exercised immense religious as well as temporal authority from his blood of the Koreish. On June 9, 1916, he proclaimed Arab independence of Turkey and occupied Mecca and the port of Jeddah, capturing the Turkish garrisons, and laid siege to Medina, and, later, cut parts of the Hedjaz railway to prevent the Turks sending reinforcements from the N. The revolt spread rapidly. The Said Idriissi of Asir took the Red Sea port of Kunsifah. On July 27 Yambo, the port of Medina, was captured, while the revolt spread northwards as far as Damascus. The Turks in the forts at Medina and Mecca were so ill-advised as to fire on the Holy Places and thus accentuated the believers' rage against them. The Turks hurried reinforcements to the scene, and the Grand Sherif had no easy task, for his army was equipped with out-of-date weapons; but they made up in fanatical fury what they lacked in equipment. The revolt in the Hedjaz delayed the development of the Turks' projected attack on Egypt; but in Aug. they advanced with a force of some 18,000 men towards the Suez Canal from the E. The British forces were drawn up near Romani, about 23 m. E. of the canal. The Turks attacked on Aug. 3, and the fighting lasted throughout the 4th. The British cavalry slowly withdrew, entangling the Turks in the sand dunes, and in the afternoon British reinforcements came up, and the British counter-attack completely routed the Turks, who were pursued until the 9th, when they attempted a stand, but were again routed by the British cavalry. The British took some 4000 prisoners and the Turkish casualties were estimated at 5000, while large quantities of guns, ammunition, and camels, horses and mules were captured. It was a decisive defeat, which secured Egypt from further attack.

The Policy of King Constantine.—Meanwhile the situation of the Allied troops at Salonika had been considerably affected by the mutations of Gk. policy. M. Venizelos and certain other far-sighted Gks. saw that the best hope of securing the position of Greece lay in an alliance with the Entente Powers, for Turkey was her hereditary enemy, while the Ger. plans for an eastern empire were in direct conflict with Greece's hopes of recovering some of her former power over the Anatolian seaboard and the Aegean Isles. But there were other

influences which affected Gk. policy. The court was Ger. in sympathy, the army was impressed with the Prussian model of efficiency, and the Gk. General Staff had little confidence in an ultimate Allied victory, as was not unnatural, considering that the Gallipoli adventure had been undertaken against its advice with disastrous results, and the Allies' efforts to avert the defeat of Serbia had been nugatory. There was also a good deal of apprehension in Greece concerning the possibility of Russia occupying Constantinople. Thus, after the fall of Venizelos in Oct. 1915, a temporising policy under the King's influence was adopted by the bureaucracy which carried on the gov. Corrupt elections, from which the Venizelists abstained, indicated that the gov. was aware of the unconstitutional nature of its policy. The Bulgarian occupation of Fort Rupel in May 1916 by permission of Skouloudis involved a derogation of Gk. sovereignty; whereas the Allied occupation of Salonika also involved such derogation, but had been constitutionally ratified. The surrender to Bulgaria in this matter was largely the act of King Constantine, and was probably inspired by fear. The King was convinced that Germany would win the War, and was no doubt sincerely concerned to save the independence of Greece at any cost. The Allies' retort was to proclaim a restriction of supplies of coal to Greece and to Gk. ships in Allied ports, with the object of preventing supplies reaching the enemy. It was, essentially, a peaceful blockade. The Gk. Gov. was alarmed, and gave orders for partial demobilisation of the army, so as to convince the Allies that Greece had not aggressive aims. But the pro-Ger. elements took the law into their own hands, and on June 12 the secret police organised a military fête in Athens, during which crowds paraded the streets and made demonstrations against the Allied embassies. The Allies presented an ultimatum to Greece. Greece was not in the ordinary sense a neutral, for under the guarantee of Hellenic liberties given by the treaties of 1863, France, Britain, and Russia had been appointed the protecting Powers, and therefore had the moral right to guide Greece in the matter of her foreign policy. Among other demands, the Allies asked for the complete demobilisation of the Gk. army and the dissolution of parliament, to be followed by fresh elections. On June 21 the Premier, Skoulodis, retired, and Zaimis, who succeeded him, agreed to the Allied demands. Thus the Allies appeared to have secured their aims; but the Ger.

agents were as active as ever, and the hope of securing the Allied position by the fresh elections was made impossible by military events. The Allied front at Salonika was now held by the British on the right, the Fr. in the centre, and the reconstituted Serbian army on the left. This position gave Monastir as the objective of the Serbs, now under the command of the Crown Prince Alexander. On the extreme left, an Italian force, based on Avlona, was preparing to advance through Albania. An Allied offensive was planned for Aug., partly in the hope of taking Monastir, which had great political importance as one of the main objectives of the Bulgarian war policy, while a further motive for the offensive was to be found in the attitude of Rumania, which was already committed in secret to the Entente. If the Allies could hold a large Bulgarian force on the Salonika front, they would prevent Bulgaria attacking the Rumanian flank. Early in Aug. General Sarrail was put in command of the whole of the Allied forces on the Salonika front. On Aug. 10 the Fr. began to bombard the tn. of Doiran, close to the junction of the Gk., Bulgarian, and Serbian frontiers. On the 11th, they occupied Doiran station and a height to the S. of the tn. and carried Doidjell; but on Aug. 17 the Bulgarians began a counter-offensive. Their principal advance took place beyond the extreme right of the Allied line on Kavalla, which neighbourhood was held only by Gk. troops, who were without instructions. When the Bulgarians occupied the forts of Kavalla on Aug. 25, they were shelled by British warships; and the effect on Gk. opinion was very considerable, for Greece had thus lost a whole prov. to Bulgaria.

Rumania's Entry into the War.—Just at this critical period, Rumania entered the War on the side of the Entente. Her position was peculiar. Her first king, Carol, who had built up the modern Rumanian state, belonged to the Catholic branch of the Hohenzollerns, and relied on the Prussian model to establish his army, and on Ger. gold to support his new state. Thus, for thirty years before the War, Rumania had been allied by interest to the Gers.; but the people in general did not follow the lead of their king. They were more exercised in mind over their fellow nationals in Transylvania who had been handed over to Hungary, and had suffered suppression of their language and religion. Societies were formed in Rumania to work for the liberation of Transylvania from the

Hungarian yoke. It was true that there was also some ill-feeling towards Russia, because she had in 1878 annexed the Rumanian part of Bessarabia; but there was not similar oppression of Rumanians in that area. With the death of King Carol in Oct. 1914 the situation changed: Carol was succeeded by his nephew, Ferdinand, who had not his uncle's connection with Germany and had married an Eng. princess, whose influence was naturally enlisted on the side of the Allies. But for two years Rumania preserved a cautious neutrality, because her strategic position was exceptionally difficult, owing to its great importance to all her powerful neighbours. But, with the Russian advance in the Bukovina in June 1916 (which will be considered in the next section) and the Allied advance in the W., the position seemed favourable for Rumania to enter the War on the Allied side. Prolonged and difficult negotiations had rallied the greater part of the Rumanian political leaders to the Allies, and, on Aug. 27, Rumania declared war on Austria. She hoped to limit her participation to war with Austria, but the Allies recognised that this would be impossible, and on Aug. 28 Germany declared war on Rumania. On Sept. 1, Bulgaria also declared war. Rumania brought an addition to the Allied forces of some half a million men, but her value to the Allies was lessened by the fact that her main purpose in entering the War was to secure Transylvania. If she expended her force on this purpose, her entry into the War might prove an embarrassment rather than a help to the Allies.

Rumania's Campaign in Transylvania.—While the Rumanian army was engaged in Transylvania, the Bulgarians could attack Rumania itself, and because of its strategic importance the Allies could not let Rumania be overrun, so that they would have to divert for its defence troops needed elsewhere. Such was the Ger. appreciation of the position, to some extent borne out by events. Rumania's first step was to invade Transylvania on August 28 at numerous points. Rumania's Transylvanian frontier was one long mountain chain crossed by numerous passes in narrow ravines, until it reached the Iron Gates at Orsova. Not only had Rumania to meet the difficulty of the narrow passes, but she was at a disadvantage, as against Austria, both from the line of the frontier, and from the railway system. Rumania's railways had been built with Austrian assistance when Rumania was an ally of Austria, and none of her railways

had been constructed with an eye to military needs; while Austria, on the other hand, possessed an excellent network of strategic railways on her side of the frontier, linked up by the frontier line curving round the foot of the mountains. There was also a serious lack of modern equipment of all kinds in the Rumanian army, which had been dependent for new supplies on what was to be obtained through Russia. Rumania was also deficient in trained leaders. She counted on the help of the Russian campaign in the Carpathians to distract the Austrian effort against her, and also on the advance of Sarraïl from Salonika to distract the Bulgarians from her southern frontier; but in neither of these expectations was she justified by events, for Russia was reaching the end of her effort, and Sarraïl had not strength enough for an advance. At first all went well with the Rumanians, and within a fortnight of the declaration of war all the passes, the strategic frontier railway, and most of the frontier towns had been occupied, and the Magyar people of south-eastern Transylvania were in full flight. But the appearance of success was deceptive. The Rumanian forces were widely scattered, while the Austrians had fallen back on a shorter and safer line, and behind this line the Germans were making preparations for a counter-attack on a scale entirely unsuspected by the Rumanians. Von Falkenhayn, formerly chief of the German Staff, had been sent to Austria to command the new Austrian 9th Army, which was being prepared for driving back the Rumanian left wing into the Wallachian plains, and further S., von Mackensen was collecting another army which was to operate S. of the Danube and in the Dobrudja. The two armies were to converge on Bucharest.

Mackensen's Campaign in Rumania.—Mackensen advanced first into the Dobrudja, and on September 6 captured Turtukai (important as commanding the ferry across the Danube to Oltenitza on the road to Bucharest), with a hundred guns and the whole of an infantry division. On the 9th Bulgarian troops occupied Silistria. The hurriedly organised Rumanian defence offered a stout resistance and forced Mackensen back some 10 m. by September 23; but the check was only temporary, because Mackensen could command new supplies and reinforcements. By weakening other fronts in men but not in guns, and by keeping up their initial superiority in guns in the Transylvanian area, the Germans were able to concentrate troops

there at a time when it was supposed that they were fully occupied on their other fronts. The Rumanian resistance in the passes proved unavailing, and by the second week in October their army was in full retreat, and von Falkenhayn's pressure was increasing. The final stages of the Rumanian campaign in Transylvania must be considered in the next section, after the relation of events in the W. and on the Russian main front, which were intimately connected with the fate of Rumania. It is sufficient at this stage to realise that in the early autumn of 1916 the position of the Entente in the Near East was far from satisfactory, while German plans in that area were nearer to realisation than they had been at any earlier period of the War. The Russian advance in Asia Minor had been too slow seriously to embarrass the Turks; the Gallipoli expedition had failed; the advance on Baghdad had miscarried with disastrous consequences to the British troops; the Salonika expedition had neither rescued Serbia nor come to the help of Rumania, while it was continually embarrassed by the uncertainties of Greek policy. German communication with Constantinople had been securely established, with the double result of securing supplies of food for Germany from Turkey and supplies of munitions for Turkey from Germany, as well as stiffening the Turkish resistance. Russia was reaching the end of her resources. The outlook generally in the Near East was black for the Allied cause.

(xi.) *THE WESTERN FRONT IN 1916.*—*Résumé of the General Position at the Beginning of 1916.*—At the beginning of 1916, Germany appeared to have good grounds for optimism. On the Western Front, having obtained for her own use the great industrial areas of Belgium and northern France, she was accelerating output at the highest pressure, while successfully holding the front with fewer troops than the Allies required to oppose her. In other areas, German successes, as shown above, had been immense. The intervention of Italy on the Allied side did not check Germany; for the Alpine frontier was likely to prevent any effective Italian movement against Austria. The German dream of a compact 'Mitteleuropa' seemed to be materialising. She held the railway to Constantinople, she dominated the Balkans; while Turkey, strengthened by German direction, still held the Baghdad railway. It was true that Germany's mercantile marine had been driven from the seas, and that her navy was cooped up in its home

ports; but it was still intact. It was true, also, that her cherished African possessions were lost or threatened, and that her great Pacific base, on which she had spent millions, had also gone, together with her other Pacific possessions; but Germany's amazing efficiency in organisation enabled her to meet the new circumstances of the War long before the Entente nations, and she had already taken steps to meet the threat of the Entente blockade and to discount the other natural advantages possessed by the Entente. Not only was she producing munitions of war in overwhelming quantities, but she was providing substitutes for those materials which she was no longer able to import from abroad, and her self-contained position made her credit system far simpler than that of the Allies. Her one concern was to maintain her internal credit, which would remain good as long as she continued to succeed in the War. Her economic position, which had given her trouble earlier in the War, had been stabilised by the summer of 1915, by which time the whole of her industrial life down to the smallest detail was mobilised for war. Her internal organisation allowed her to put her people on rations and to supervise all distribution of food supplies in a manner which at that time was impossible to the Allies. Being in a dominant position in relation to her allies, she had no need to fear the disagreements that commonly arise among equals, while she entertained the hope of advantage from possible differences among the Entente Powers. Britain was the most dangerous of her enemies, on account of her wealth and her potential man-power; but there were signs that Britain was wasting her resources, and that her rulers had not yet grasped the needs of modern warfare. Criticism in Britain of the British Gov.'s conduct of the War had been considerable during 1915.

The Munitions Question in Great Britain.—The serious shortage of munitions in the spring had been met by the appointment of Mr. Lloyd George to be Minister of Munitions with wide powers; but it was soon realised that it was not a matter of a few months to organise munitions production on the great scale required. The general condition of Britain was complicated by the anct. tradition of liberty, which made the British people suspicious of undue interference from the state even in time of war. Britain had to pay the price of her free institutions by delay in

organising for war; while Germany, temporarily at least, benefited from the dragooning of her people before the War, which induced in them the habit of acquiescence without protest in every restriction and new form of control deemed necessary by their gov. British political leaders had to consider the strength of the trade unions, with their insistence on protection for the worker from exploitation, and they had also to consider the strong body of Liberal political opinion which was traditionally opposed to all forms of compulsion in national affairs. The original scarcity of munitions in the spring of 1915 had been met, at first, by the expedient of appointing several committees, with powers that often overlapped; but the resignation of Lord Fisher from the Admiralty and the growing realisation that the problems of the War were not being efficiently treated led to the reconstruction of the Asquith Ministry into a 'National Ministry' including representatives of all parties. A Munitions Act was passed providing for gov. ownership in full control of munition factories so as to secure rapid production, even at the price of greatly enhanced wages. Workmen acquiesced in this transition of control, there being no opportunity for exploitation. But in the mines, which were not under such complete control, there was opportunity for exploitation. Trouble arose with the S. Wales miners in July 1915, and, when the Munitions Act was extended to mines, 200,000 miners in S. Wales went on strike on July 15. A settlement, which took the form of a surrender to the miners' demands, was arranged on the 20th, but the stoppage involved a serious reduction in coal output and was dangerous in its effect on opinion among Britain's allies and on the British troops. The chief lesson of this episode was that compulsion applied piecemeal was worse than useless; but it was a lesson which took time to learn. Meanwhile, gov. expenditure continued at a prodigal figure. Schemes of social reform were continued. Payments to dependants of soldiers were made on a scale far beyond those of other countries and munition workers were paid wages greatly in excess of any peace-time rates, with the inevitable effect of exasperating the men in the fighting forces. Contractors for various forms of material, too, made very large profits, which entailed a serious loss to the national revenue. The nation, despite its difficulties, during 1915 responded to every call on its exertions. Women began to take a large part, not only in many war areas as nurses and in

other capacities, but at home they appeared for the first time as tram-conductors, chauffeurs, postmen, railway porters, and in various occupations normally considered unsuitable for women.

The Cavell Case.—Reference may be made here to the fate of one heroic British woman, because it had an effect difficult to overestimate on both neutral and Allied opinion. Miss Edith Cavell (q.v.), a woman of forty-three, the daughter of a Norfolk clergyman, had since 1906 been the head of a nursing institute in Brussels. On the outbreak of war she transformed her institute into a hospital for wounded soldiers and nursed without discrimination British, Fr., Belgians, and Gers. During the first year she succeeded in helping many wounded Allied soldiers to escape to Holland, whence they returned to their armies. She was thus in the highly dangerous position of being a civilian collaborator with the fighting forces. Hereforts were discovered by the Ger. military authorities and on August 5, 1915, she was arrested and imprisoned. She was kept in solitary confinement in the military prison of St. Gilles, and no word of her arrest reached her friends until three weeks later. On August 26, Sir Edward Grey asked the American Ambassador in London to get the American Minister in Brussels, Mr. Brand Whitlock, to inquire into her case. On Sept. 12, Mr. Whitlock was informed that Miss Cavell had admitted her offence, that a Belgian advocate was undertaking her defence, and that no interview with her could be permitted. The legal adviser to the American Legation took every possible step to get into touch with Nurse Cavell or her representative, but failed, and it was not until October 4 that he was informed that her trial was to take place on the 7th. Her trial with that of a number of other accused persons took place on that day. Nurse Cavell, by admitting the charge, had given the Gers. their chief evidence against her. During the next ensuing days the American Legation endeavoured to learn what was happening. On October 11, Mr. Hugh Gibson, the Secretary of the Legation, continued to interrogate the Ger. authorities, and, as late as 6.20 p.m., was officially informed that the decision of the court had not been pronounced; but at 8 p.m. M. de Leval, the legal adviser, heard that sentence had been pronounced at 5 p.m. and that Nurse Cavell was to be shot at 2 a.m. on the following morning. The American Legation made a last attempt to save her. Two pleas for mercy were

drawn up, one to Baron von der Lancken, chief of the political department of the Ger. Military Gov. in Belgium, and the other to Baron von Bissing (q.v.), the Ger. Governor-General. Mr. Whitlock himself, although ill in bed, wrote a personal letter to von Bissing, and Mr. Gibson, M. de Leval, and the Marquis de Villalobar, the Spanish Ambassador, called on Baron von der Lancken at 10 p.m. The sole power of reprieve lay with von Bissing, the type of military pedant, and the deputation was dismissed at midnight. That same night a British chaplain, Mr. Gahan, was admitted to Nurse Cavell's cell, and she asked him to tell her countrymen that she died willingly for her country and forgave her enemies. 'This I would say, standing as I do in view of God and eternity, I realise that patriotism is not enough. I must have no hatred or bitterness towards anyone.' At two in the morning she was shot. Some difficulty was experienced in providing her executioners, and there is authority for saying that a number of Ger. soldiers were put under arrest for refusing to act. Her execution, even if justified by the logic of the military code, was a diplomatic blunder, aggravated, too, by the secrecy of the whole proceeding. Its effect on neutral opinion was in the highest degree damaging to Germany.

The Recruiting Problem in Britain.—Meanwhile, in the later months of 1915, the recruiting problem in Great Britain was causing anxiety. The patriotic response in the early months of the War, and the high average number of recruits since then, had not reached proportions adequate to the greatest crisis in the nation's history. There was a growing opinion that the voluntary system operated both wastefully and inequitably. But the voluntary system was deeply rooted in the national character, and it was expected that strong opposition on grounds of principle would be aroused by any attempt to impose conscription (q.v.). In August 1915 a National Register had been taken, which provided information of the man-power available, and from this it was obvious that some form of compulsory service would soon become necessary unless the rate of voluntary enlistment could be increased. In this emergency the Earl of Derby (q.v.), was appointed Director of Recruiting. The main proposals of what was known as the 'Derby Scheme' were that men were to be recruited in forty-six groups, according to age, the married men filling the last twenty-three groups. These groups were to be called to the colours

as occasion demanded. Local committees were appointed to exempt men who were considered essential to vital industries, and men enlisted under the scheme could afterwards claim exemption at special tribunals on various specified grounds. The first limit of enlistment under the scheme was November 30. It was made clear by a definite assurance that if young unmarried men did not enlist the married men would either be released from their obligations or a Bill would be introduced to compel the young unmarried men to serve. The last date for enlistment under the scheme was extended to December 12, with the result that huge numbers of recruits came forward in the last week. Owing to this eleventh-hour congestion it had been necessary to attest all comers and to reserve medical examination until later, it being recognised that a considerable proportion of those enlisted would inevitably be ultimately rejected on medical grounds. On January 4, 1916, Lord Derby issued his report. Nearly three million men had been 'attested' for later service or rejected outright, but of this total, nearly a million had so far not been medically examined. It was estimated that the total of men available for service would not be more than 830,000. There were still some 650,000 single men not officially exempted who had not enlisted, and Lord Derby stated his opinion that married men could not be held to their obligations 'unless and until the services of the single men had been obtained by other means.' On January 5, Mr. Asquith introduced a Military Service Bill in the House of Commons. The opposition was not as great as had been anticipated, for the bulk of the nation was beginning to appreciate the need for universal service. Sir John Simon (*q.v.*), then Home Secretary, resigned and led the Opposition, but the Bill passed rapidly through all stages in the House of Commons with a very small minority in opposition. The passing of the Bill had an excellent effect on Britain's relations with her allies, who realised that this measure expressed her final determination to win the War at all cost. See CONSCRIPTION.

The Ger. Attack on Verdun.—With the object of a final reckoning with the still undefeated Fr. armies, the Gers. now prepared a new plan, of which Verdun, the great fortress on the right of the Fr. line, was the objective. The Ger. intention was to anticipate an Allied offensive in the W., which was expected as a corollary to the British recruiting and munitions measures. The Ger. High

Command believed that they had never yet really used their immense superiority in heavy guns on the Western Front, and in the attack on Verdun they proposed to prepare the way for every attack by bombardment on a comprehensive scale, so that there should be no avoidable waste of men through being held up by defences which might be completely destroyed by shelling. The Ger. plan was to attack at advantageous points all along the front so that the Allies would not know whether the attacks were feints or the beginning of a general offensive; and while their enemies were thus fully occupied the Gers. would be able to concentrate men and guns behind Verdun. Once the line was pierced at Verdun, fresh troops would be available for a final advance on Paris, which should end the War. Even if this final victory were not won, the capture of Verdun would bring great prestige to the Ger. arms, and thus influence neutral opinion. A Ger. attack which should anticipate the Allied offensive would also have the effect of making the Allies waste much of the munitions prepared for their offensive in the defence of Verdun and also in a counter-offensive which they would have to undertake at some other point on the front. An immense concentration of artillery began. The Gers. brought guns from the Eastern Front and from the interior of Germany and many of their best troops were taken out of the line and rested in order to prepare for the attack. The Ger. Crown Prince was in immediate command of the area opposite Verdun, and had, as his adviser, the old Marshal von Haeseler, who had once been the Emperor's military tutor; but the general plan was the work of Falkenhayn (*q.v.*). The feint attacks along the front began in the first week in January. The Fr. line was attacked in Champagne at the Butte de Tahure, at Massiges, near Navarin Farm, and E. of the Tahure-Somme-Py road. There were attempts to cross the Yser near Steenstraete and Het Sas, and there were considerable attacks on the Vimy Ridge. S. of the Somme, between Frise and Dompierre, the Gers. after violent bombardment obtained a measure of success. There were also attacks on the Aisne and in the St. Dié area. The preparations for the attack were assisted by increased activity by the Gers. in the air. In January there first appeared a new type of Fr. aeroplane, the Fokker, named after its Dutch inventor, Anton Fokker (*q.v.*), and similar in design to the Fr. Morane machine. It was destined to

take heavy toll of Allied lives before the end of the War. It should be mentioned, however, that Fokker had previously offered his aeroplane to the British authorities, and that the offer was refused. With these aircraft the Gers. made increasingly bold attacks on the Fr. lines of transport in the Verdun area, and they also made considerable use of Zeppelins, one of which was brought down in flames by Fr. anti-aircraft guns near Revigny on February 21. The Fr. were not entirely ignorant of the Ger. preparations. Rumours had reached them of the presence of the Ger. Emperor at Mézières and of a great rehearsal for the attack held behind the front. But the attack on Verdun might be only a feint to distract attention from the real objective elsewhere, and the Fr. therefore could only make general preparations to hasten supports to whatever part of the line was subjected to the main impact. Verdun itself was the strongest of the four great fortresses or entrenched camps defending the eastern frontier of France against Germany, the others being Belfort, Toul and Epinal. It was fortified with an inner line of redoubts, and an outer ring of forts and batteries thrown out in a circuit of some 30 m. Unlike the northern fortresses of France (Lille, Laon, and Rheims), Verdun had not been neglected, but had been brought to the highest pitch of pre-War efficiency with concrete and steel in place of the former masonry and earthworks, and heavy guns mounted on turrets which could rise or sink as required. At the beginning of the War Verdun had been in a precarious position. Hasty attempts had been made to construct advanced trenches, but the work had scarcely begun before the Crown Prince was almost at the gates. The city was then held by Sarraill with his field army, and was almost invested when the Ger. failure at the Marne compelled a general retirement. During the Battle of the Aisne the Crown Prince attacked from Montfauncon, and secured the Argonne as far S. as the Vienne-Varennes road. Von Strantz won a bridgehead at St. Mihiel, but the effort failed to connect him with the Crown Prince's right. Since then there had been no serious attempt on Verdun. In the spring of 1915 the Fr. had won Les Eparges, which gave them an advanced position in the Woëvre, but they failed to straighten the St. Mihiel salient. For sixteen months the Crown Prince had dealt hammer blows in the Argonne in an attempt to join up with von Strantz at St. Mihiel; but he had failed. Verdun

lies on both sides of the R. Meuse in a tiny plain in the midst of hills. On the right bank the Heights of the Meuse rise abruptly from the riv. to some 500 ft. above the level of the riv. valley. These heights are a plateau partly cultivated and partly covered with great woods. The inner circle of forts is at the first crest of the rise, the outer at the highest elevation. Sarraill had pushed out his front into the plain of the Woëvre across the Heights of the Meuse, and the Fr. positions in February 1916 stretched out from Verdun in a great horseshoe strongly entrenched at all points likely to be attacked. It was a strong position, but all transport for the salient had to be sent across the bridge of Verdun and through the city, and furthermore, the railway communications with Verdun were open to attack. The main Meuse valley line was cut by the Gers. at St. Mihiel, the Paris line by St. Meneshould was menaced by the Ger. long-range guns, and there remained only the small branch line from Bar-le-Duc. Excellent as were the general Fr. dispositions made to meet a big attack on Verdun, they depended on the trench systems being kept in the condition in which Sarraill had left them; but the prolonged stagnation in that area, and the fact that the lines were thinly held by territorial troops, had permitted the trench system to fall into disrepair at certain important points.

Battle of Verdun (First Phase).—A bombardment was begun by the Gers. on February 16, on a front of some 21 m., curving from Montfauncon to Fromezey. Verdun itself was bombarded with heavy guns, and the Governor ordered the whole civilian population to leave the city. Fr. airmen reported massed batteries collected in the woods, and the Fr. realised that a great attack was intended; but still they awaited the more prolonged bombardment which had usually preceded great attacks. The Gers. were, however, about to try a new method. Instead of the forty-eight hours' heavy bombardment which had been customary, they proposed to use only a short period of far more intense fire than had been known before, and on the morning of the 21st this bombardment began. It was by far the fiercest bombardment theretofore experienced. It completely obliterated the first Fr. lines, broke up the communication trenches, and altered even the shapes of the hills. Close upon it the Ger. infantry moved forward to the attack, some fourteen divisions against the three Fr. territorial divisions who were holding the 7 m.

of centre between Brabant and Herbebois. The Fr. followed their usual habit under bombardment of falling back to their second line from which they could make a counter-attack under the fire of their 75's; but when they fell back here the consequences of neglect became apparent. The trenches in the second line were poor and gave bad cover, and the ways out of them were badly arranged and gave poor access for the counter-attack; while the brilliant handling of the Ger. artillery made it for the time impossible to bring help from the Fr. rear. But late in the afternoon the counter-attack began, and won back the support line in the Bois de Caures, which had been lost in the morning. Before dawn on Tuesday, the 22nd, a new bombardment was begun by the Gers., followed by fresh infantry assaults. The Fr. could not hold their line against the successive waves of Ger. infantry, and that evening began a general retirement, reaching, by the morning of the 23rd, a line from Samogneux to Ornes, and by night it was imperative to retire still further. On the succeeding night the Fr. troops, which had fought against the heaviest odds for four days and nights, made a supreme stand, while the retirement was being completed to prepared positions on the highest parts of the plateau, stretching from Vacherauville on the Meuse, along the Côte du Poivre (Pepper Hill), and southwards to the gorge of Vaux at the edge of the hills. This position was the last defensive line covering Verdun. If it failed Verdun must fall. In a heavy snow-fall on the Friday morning the Gers. began their new attack. The Fr. position was better than it had been for the two previous days, because they were now occupying a prepared position, and two brigades, the first of the reinforcements, had been added to their strength, while the Gers. were late according to their time-table, for on this, the fifth day of the battle, they should have been in Verdun. But the total number of Ger. divisions on this short front had now grown to eighteen, and they flung themselves on the Fr. remnant with immense strength. The two main Ger. attacks took place on the Poivre crest at one end of this section of the line and on Douaumont (q.v.) at the other. The attack on Poivre failed, although it was continued throughout the day; but that on Douaumont was fiercer and involved great slaughter. Time and again waves of Ger. infantry came on, only to be decimated by the well-directed fire of the Fr. guns, until

finally, on the evening of the 25th, the Fr. front was pierced in the neighbourhood of the ruins of the old fort of Douaumont by the 24th Brandenburg Regiment advancing under the eye of the Emperor, who was watching events from the hills behind Ornes. But the victory was destined to be barren. There had arrived in Verdun that night a Fr. General, General Pétain, young and determined, who was to become one of the great figures of the War. He had a difficult task to reorganise the defence; but the first step taken under his direction on the following morning was dramatically successful. The famous 30th Corps of Nancy, who had held the Grand Couronné at the Battle of the Marne, were pitted against the Gers. at Douaumont and drove them back from the crest of the ridge, with the exception of a handful who held out in the ruins of the fort. This successful counter-attack ended the first phase of the battle and was the most critical point of the whole operations. The Gers. regarded the checks on their flanks as only passing embarrassments and retorted by attacking the centre near the farm of Haudromont and the Fr. right on the edge of the plateau. The battle continued into the night; but everywhere the Fr. lines held. Meanwhile on the extreme Fr. right the scattered detachments in the plain of the Woivre were successfully drawn in until they rested at the foot of the plateau. That night there was another heavy snow-fall; but all Sunday and Monday, the 28th, the fight continued. On the Sunday the Gers. tried to advance along the Fresnes-Verdun road with the object of winning a position behind the main Fr. line of defence; but they were repelled. The Ger. High Command now realised that their frontal attack had failed. It had depended on the Fr. lines being destroyed so quickly in succession that the Fr. would have no time to recover between each attack; but the bombardments had failed to achieve this purpose. After each attack the Fr. had re-formed on an unbroken front, except at Douaumont, where, however, they had speedily repaired the single breach in their line. The Gers. therefore reverted to their more usual method when attacking a salient, of trying to drive in the two flanks. It was particularly important that they should carry the heights on the left bank of the Meuse, because the guns on these heights dominated the Ger. positions on the Heights of the Meuse across the riv., and if the Fr. could be driven back on the left bank their

communications on that bank would be threatened and at least thrown into great confusion. At the same time the Gers. planned an attack on the right flank of the salient at Vaux.

*Battle of Verdun (Second Phase).—*The attack from the N.W. began on March 2, with considerable artillery activity on the front between the Argonne and the Meuse at Forges. Forges lay some 2 m. from Samogreux across the Meuse in the valley of the Forges stream, and between Forges and Verdun lay the ridge known as the Goose's Crest with its highest summit in the hill of Mort Homme, and on this crest the Fr. had prepared their principal defensive position. The Ger. bombardment continued for four days, and, in order to prevent the Fr. sending reinforcements to this area, an attack was also made once more on the Douaumont front. The Gers. entered the ruined village of Douaumont, but failed to reach the crest of the plateau further S. Meanwhile a general bombardment of the whole front from Fresnes to the Argonne had begun. Pétain had realised the Ger. intention of attacking the W. bank of the Meuse, and had made his preparations on the morning of Monday, March 6, before the bombardment ceased and the Ger. advance began upon the Forges valley. The Fr. right was in an untenable position, since, immediately across the riv., the Gers. held all the opposite bank to the Hill of Talou, which had become 'No Man's Land,' and could shell at will the Fr. positions on the left bank. Accordingly the Fr. fell back behind the Goose's Crest. On the 8th the Gers. transferred their main effort to the front at Vaux. Vaux lies in a little valley running up into the plateau, up which run a road and a railway, and down which runs a small stream. The hills on each side are covered with patches of wood. On the N. the hill-crest is capped by the Bois d'Hardaumont and on the S. the old fort of Vaux stands on the crest. On the early morning of the 9th, the Gers. attacked and captured the ruins of the village; but the Fr., in a bayonet charge, soon drove them out. At daylight the Gers. attacked again, not only up the valley, but also up the slopes to the S. against the old fort. In spite of the vigour of the attack it was held by the evening without any loss of ground. The day marked the end of the famous 3rd Brandenburg Corps as a unit, their great losses involving their withdrawal. On the 10th the Gers., now heavily reinforced, again attacked; but the Fr. guns prevented them from coming to close quar-

ters. On the 11th the Gers. made their supreme effort. In the early morning they occupied the eastern end of the village. Again their left climbed the slopes to the S., but only to reach the wire round the fort in an exhausted condition; and on the following day only an intermittent bombardment took the place of the infantry attacks. Had it succeeded the attack on Vaux would have turned the Fr. position at Douaumont; but it had failed, and a number of minor attacks all along the slopes on the Woerre side of the plateau had also failed. According to their usual plan the Gers. immediately swung back to attack once more the other flank of the salient. From the 9th to the 14th the struggle was resumed for Bethincourt and the Goose's Crest, the Gers. making their great thrust for the Mort Homme hill with some 25,000 men on the morning of the 14th. Their successive attacks secured them a mile of ground, but it was only the outlying part of the Mort Homme position. In this manner was concluded the second stage of the battle. The result of the Ger. attack on the W. bank of the Meuse had been to win a triangle less than a mile deep between the Forges stream and the Bethincourt-Cumières road. The key to the position, Mort Homme, was still in Fr. hands. On the E. bank the Gers. had secured most of the Bois d'Hardaumont; but they had made no progress towards the definitive capture of Douaumont. Their losses in the whole battle had been two to one compared with the Fr., and, in the later stages, they had lost four times as many men as the Fr. But having announced that they were about to achieve a victory they were compelled to go on until they had something tangible to show for their great effort. The defences of Verdun depended on Douaumont and Charny. These in turn depended on the Mort Homme, and the Gers. had failed to take Mort Homme by a direct attack. Accordingly they now prepared a flank attack from the W.

*Battle of Verdun (Third Phase).—*On Friday the 16th the Ger. guns opened a bombardment of the lines between Avocourt and Bethincourt. The Gers.' original plan had by now completely miscarried, and even if they had been able now to win Verdun their losses would have been out of all proportion to the acquisition of the city. They had counted also on an Allied counter-attack on other parts of the front, to meet which they had considerable armies waiting all along the front; but the counter-attack did not develop, for

the Allies had allowed nothing to distract them from the defence of Verdun. General Joffre's Order of the Day issued to the defenders of Verdun during the early part of March summed up the position by the statement, 'the Germans need a victory,' because on no other ground could they have continued their wastage of men over so long a period without result. By the method of holding his first line lightly, falling back a little when necessary, and regaining the line by a counter-attack, Pétain insured that the losses would be as small as possible, and that the Ger. plan would be continually upset. The Ger. purpose of obtaining a spectacular victory in order to impress their allies and neutrals seemed now to have little hope of fulfilment. But still they persisted. By the 20th their fresh bombardment on the W. bank of the Meuse reached its height, and that afternoon the first attack was made on the line between Avocourt and Malancourt, and by evening they were on the edge of the hill slopes towards Mort Homme. On the 28th they attacked Malancourt with innumerable waves of troops. But General Pétain realised that the chief danger was at the Bois d'Avocourt, and accordingly he counter-attacked there on the following day. The counter-attack was completely successful, the Gers. being driven back for some 300 yds. Meanwhile, on the 30th, the reinforced Gers. again attacked Malancourt and during March 31 the Fr. were compelled to evacuate it. Pétain also withdrew his troops from Haucourt to a position on the slopes of the hills. On April 3, General Mangin's (*q.v.*) division made a desperate counter-attack, which drove back the Gers. nearly to their former positions with very heavy losses. But a great Ger. attack on the key position of Mort Homme developed on the 9th. Fierce fighting continued until the 11th; but the Gers. failed to achieve any considerable success, and by the Tuesday it was clear that their main purpose had again failed. They had used some nine divisions in the attack, and had again suffered the heaviest casualties, out of all proportion to the Fr. losses, while they had secured not a single Fr. key position. Sporadic attacks continued; but the main plan was now abandoned. The first Battle of Verdun came at a less critical time than the Battle of the Marne, but it was as impressive a Fr. victory and exhausted more of the Ger. strength than the Battle of the Marne. It was true that it delayed the Allied offen-

sive and used up considerable stores of Allied munitions; but the wastage of men and munitions was far more serious on the Ger. side. The Gers. had undoubtedly placed too much reliance on their impressive collection of artillery, and the battle showed clearly that even under modern conditions of war the infantry were still the deciding factor. The first attack on Verdun ended in failure; it was not until May 3 that the Gers. were ready to begin the second Battle of Verdun. In April Pétain had succeeded Langle de Cary as commander of the general section from Soissons to Verdun, and the second defence devolved on his successor there, General Nivelle. The attack this time opened on the W. bank of the Meuse with Mort Homme as the objective. The battle dragged on with great expenditure of man-power by the Gers. until the 21st, when they secured the summit of Mort Homme. On the E. bank on May 7, the Gers. drove the Fr. out of Fort Douaumont; Mangin recovered it on the 22nd, but the Gers. took it again on the 24th and on the 25th pushed on by Haudromont Wood and Thiaumont Farm, so outflanking Vaux on the W. On June 1 they took Dambloup, but Vaux Fort, under the command of Major Raynal, held out until the 6th. On June 11th the struggle recommenced with the Gers. only 4 m. from Verdun. On the 23rd the Gers. entered Fleury, but were driven out again, and by the 30th the Fr. had recovered Thiaumont and neutralised the Ger. advantage. With the opening of the Battle of the Somme, the attack on Verdun lost its vital importance, and the battle gradually relapsed into sporadic engagements. The Fr. troops had confounded their critics by opposing a remarkable defence in the most difficult circumstances over a prolonged period against immense odds. On the wooden casing of a bomb-proof shelter in the Fr. firing-line a British war-correspondent found written these words: 'Mon corps à la terre, Mon âme à Dieu, Mon cœur à la France.' That was the spirit of the defenders of Verdun.

(xii) THE ITALIAN FRONT IN 1916.
—*General Position at the Beginning of the Year.*—Italy's early achievements were scarcely appreciated by her allies, who did not fully realise the difficulties she had to face after she entered the War. Along the entire mountain frontier the Austrians held all the passes, and only in the E., on the Isonzo, could Italy hope to make much advance. But if she launched her main offensive in the E.,

her communications could be directly threatened from the Trentino, the Dolomites, and Carnia. Thus she had to try to secure her position in these regions at the same time as she made her thrust on the Isonzo (*q.v.*) front. This front itself presented extraordinary difficulties, for beyond the Isonzo was the Carso plateau, a terrain of rock without soil, where the Austrian defences were cut out of the solid rock. To the N. lay Gorizia (*q.v.*), around which city was a formidable entrenched camp defended by some 200,000 men and with defences covering some 60 m. in width. In the flank and rear of the Italian communications was the dangerous Austrian salient of the Trentino, which ran down into the plain of Lombardy and therefore gave the Austrians every opportunity for sudden flank attacks. In the internal politics of Italy there were additional difficulties. Probably the mass of the Italian people were sympathetic to the Allies; but Germany controlled so much of Italian commerce and finance that war with Germany was the last thing desired by many influential people in Italy, and this led to intrigues which seriously interfered with the prosecution of the War against Austria. In spite of these difficulties Italy's intervention had been valuable to the Allies in drawing off from other fronts some thirty-eight divisions of the Austrian army, including some picked mountain troops. Sent thus against Italy these forces were isolated from the other fronts on which Austria was fighting, and their loss seriously interfered with the general Austrian plans for the movement of reinforcements. During the winter of 1915-16 there was considerable activity all along the Italian front. In Oct. and Nov. a bombardment of Gorizia continued for a fortnight, while Italian attacks secured some trenches and the village of Oslovica, N.W. of Gorizia, and some ground in the Carso. But the main campaign was carried on among the mountains. During the summer and early autumn the main passes had been won by Italy, with amazing feats of mountaineering by her troops. Far up on the glaciers were the Italian direction posts and even the heavy guns had been hauled up into positions as high as 9000 ft. Not only were the actual feats of engineering and transport such as had never been previously undertaken; but the Italians succeeded in maintaining themselves and their guns in these high positions during the intense winter cold.

Food and ammunition had to be brought up during even the wildest weather, when normally even the passes might be considered impracticable. Much was transported by aerial cables, capable of bearing weights up to half a ton; but even the use of these mechanical devices was unavailing against many of the dangers which had to be faced, and the Italians were opposed by an army containing hardy mountaineers who could be relied upon to meet them on their own ground. There were many desperate fights among the snows. In the middle of March 1916 the Italians again bombarded Gorizia, and for a few weeks there were several attacks and counter-attacks; but the spring floods from the mountains made much progress difficult. In the mountains a great mining exploit was successfully carried out by the Italians. W. of the Falzarego Pass, connecting Cortina with Bozen, there is a mountain spur called the Col di Lana, which commands the western road. It had been taken by the Italians in Nov. 1915, but the summit was not held and the Austrians held the northern slopes. A tunnel was driven through the hill which took three months to complete, and the Austrian position was blown up on April 17. On the crest of the Adamello mountains in the W. of the Trentino, on April 11, 300 Alpini on skis drove the Austrians from their positions in a snowstorm, and this exploit, at a height of 10,000 ft. in Arctic weather, was followed by a second movement on April 29, when two thousand Alpini followed the same route and drove the Austrians from the crest of the mountains, thus dominating the Val di Genova and winning a position on the flank of the enemy lines in the Val Giudicaria. The Austrians now began to collect troops in the Trentino for an offensive.

Austrian Trentino Offensive.—There were two Austrian armies in the Trentino, under Dankl and von Koevess, the whole under the command of the Archduke Karl, the heir to the Austrian throne. Throughout the winter the Austrians had gradually been strengthening one section of the front between the Val Lagarina and the Val Sugana. The Italians were aware of the concentration of men and guns, but anticipated only a local offensive. In fact, the Archduke Karl was preparing one of the great offensives of the War. In thus organising a large-scale offensive against Italy at this time, however, Austria gravely underestimated the strength of Italy, and a total force of some 400,000 men was scarcely adequate

for overrunning Venetia and cutting the two strategic railways leading to the Isonzo front; but Austria obviously intended so to embarrass the transport for the Isonzo that General Cadorna, who was commanding there, would be unable to carry out the anticipated offensive. The plan was probably similar to that of the Gers. at Verdun, and it was no coincidence that the Austrian heir-apparent should command in the Trentino as the Ger. heir-apparent had at Verdun. Success in such ventures would have greatly strengthened the dynasties. The Italian position in the southern Trentino, at the beginning of May, ran from the Lake of Garda just S. of Rovereto in the Val Lagarina eastward up the Val Terragnolo, and thence N.E. just across the frontier facing the Austrian lines on the Folgaria plateau; thence, due E. and then N. within the frontier line to the Cima Manderiolo, whence it ran N. across the valley of the Brenta to Monte Collo, N.W. of Borgo. The main peril to this position came on the flanks, for in the Val Lagarina on the W. and the Val Sugana on the E. there were both roads and railways to support the Austrian advance. In these valleys accordingly the Italians had made good defensive positions; but in the centre there were also several roads along which an Austrian advance might turn the defensive positions on the flanks besides light railways connecting with the main line through Vicenza. The Italian front was held by the 1st Army, which was very short of artillery, and General Brusati, who had been in command, had miscalculated the weight of guns the Austrians could bring against him. In April General Cadorna, the Italian Commander-in-Chief, moved his headquarters to the 1st Army and replaced Brusati by General Pecori-Giraldi, who began a drastic reorganisation. But before the work could be completed the Archduke began his advance. A great bombardment began on May 14, when over 2000 guns, of which some 800 were of heavy calibre, destroyed the Italian front line over a length of 30 m. In the centre, the Italians fell back at once to their support lines, but offered a stout resistance on the flanks at Zugna and W. of Borgo. On the 19th, the centre in the upper valley of the Astico was driven back. On the 20th Cadorna decided to withdraw the centre to a position well to the rear. By the 24th, this withdrawal had been completed in good order, but the Austrians followed up so quickly that there was no time to establish the new position. By the

25th the Austrians had advanced so far as to attack Coni Zugna, the peak behind Zugna Torta to which the Italians had retired, and they were also attacking the important mountain of Pasubio, N.E. of Chièse. Pasubio had now become a salient, since the Austrians had advanced up the Vallarsa as far as Chièse, under the Buole Pass. If the advance continued the Austrians must capture Pasubio, and if they did they would be able to turn the whole Italian centre and open the way to the plain of Venetia. Cadorna was hastily collecting a new army around Vicenza, the Italian 5th Army which had been concentrating further E. for an attack on Gorizia. A total of just under 500,000 men reached the foot of the hills in ten days; but could not become effective as a reserve until June 2. By the 25th, the Italian right had retired safely to a point prepared on the E. bank of the Maso stream. But the right centre in the hills known as the Sette Comuni was driven back on the 25th and 26th from all the heights E. of the Val d'Assa, and by the 28th the Austrians had occupied Monte Moschicce, just N. of Asiago. Meanwhile on the Austrian right desperate fighting continued which was to prove the critical point of the whole advance. Again and again Austrian massed attacks on Coni Zugna and Pasubio were driven back, until on May 30 they reached their climax with tremendous assaults on the Pass of Buole; but the Italians did not surrender any ground, while the Austrian losses on this day alone were some 7000, and in the week's fighting some 40 per cent. of their fighting troops were killed. The Austrians now attacked Pasubio on three sides, and fighting continued here for some three weeks, but the Italians held their own against great odds. In the centre, by June 1, the Austrians had driven back the Italians from many points on the last ridge of hills between them and the plain, and by the 4th had reached a point only 18 m. from Vicenza. But at last Cadorna's new army began to make its presence felt and the Austrian advance was stayed. The Italian position now ran from Zugna Torta to Pasubio, then S. of Posina to the Astico, S.E. of Arsiero, E. of the Val Canaglia, along the southern edge of the Asiago plateau to the E. of the Val Campomolon, and then northwards along the edge of the plateau on the western bank of the Val Sugana. While the new Italian army was preparing to attack, a great struggle continued

for the Posina heights and in the Sette Comuni. On the Posina the Austrians were trying to reach Schio and the plain, while in the Sette Comuni they were trying to turn the Italian right in the Val Sugana. This fighting was the supreme counter-effort of the sorely tried Italian defence. On the night of June 4, the Austrians violently attacked Ciove, the last Italian position S. of the Posina R., and again on the 12th, when the whole ridge was devastated with heavy guns. On the 13th the attack was renewed in even greater strength, but again without success, although the Italian brigade holding the point lost seventy per cent. of its strength. In the Sette Comuni the chief Austrian attacks were on Monte Cengio, the Val Canaglia, and the Val Frenzele, where they were within 4 m. of Valstagna in the Val Sugana. From June 15 to 17 the Italian troops on Monte Pau, at the southern edge of the Sette Comuni, held up what proved to be the last great Austrian attack.

Italian Counter-offensive.—After this the fighting declined into an artillery duel, and a week later Cadorna began his counter-offensive. While the Austrian advance had temporarily held up the Italian offensive and proved very costly to the defence, as was natural in a heavy bombardment in rocky country where every shell took full effect, it had from the Italian point of view the valuable effect of rousing the country to the danger of the Austrian threat and diminishing the apathy which had threatened the Italian arms. A new Ministry was one of its results. Signor Salandra, who had been Prime Minister, was defeated and his place was taken by Signor Boselli, with Baron Sonnino still in charge of Foreign Affairs. But for Austria the effect of her advance was to prove disastrous, for she had concentrated in a narrow salient, inadequately served with railways, a large number of her best troops who were opposed by an enemy determined to prevent her withdrawing them for service elsewhere if danger threatened on her other fronts. Further on, at the time when Cadorna prepared his offensive, grave danger was threatening Austria in Galicia, where Brusilov (q.v.) had begun his great attack, which will be considered shortly. The Italian left in the Pasubio and Buole Pass region had been heroically held by the Alpini, fighting and sleeping in deep snow, and the main danger from the Austrians now threatened in the

centre and in the E. The Italian counter-offensive began on June 16, when on the extreme right of the Italian front two columns of Alpini drove two Austrian regiments from Monte Magari, a 5000 ft. peak above the Val Sugana, which is the northern end of the Sette Comuni plateau. In spite of a strong Austrian defence the Italian right began to close in on Asiago, and on the 20th the centre advanced on the heights S. of the Posina and on Monte Cengio. Meanwhile Brusilov's advance was beginning to help the Italians by necessitating the withdrawal of Austrian troops, and the pace of the Italian advance continually increased. Between the Brenta R. and the Adige they won ground everywhere. In two days the Austrians lost more ground than they had gained in their six weeks' offensive. Their retirement, however, was skilfully conducted and they had few losses in men or guns, while they had now reached a strong position, where for the time they were able to establish themselves. But their offensive had not only failed but had given the Italians new confidence, forced them to improve their communications and shown them that it was possible to move their troops from one front to another rapidly and effectively. Cadorna had succeeded in hastening troops from the Isonzo to the Trentino and he now reversed the process. (See ISONZO.) Boroevitch von Bojna, the Austrian commander on the Isonzo front, had underestimated the power of recovery of the Italians after the Trentino fighting, a factor which favoured the surprise attack which Cadorna was preparing. The centre of the Italian front, in July, 1916, lay opposite Gorizia itself. Gorizia lies in a little plain defended on all sides by hills. W. of the Isonzo the Austrians held the line of lower heights. N. of the city lay the Ternovannerwald, with its main positions of Monte Santo, Monte San Gabriele, and Monte Santa Caterina. The right wing of the Italians lay along the W. edge of the Carso plateau itself, a bleak stony upland projecting westward into a great loop of the Isonzo and across the projection runs a deep dry valley called the Vallone, running almost from the plain of Gorizia to the Adriatic. This valley formed an admirably hidden line of communication behind the Austrian front; for, while the Italians held most of the projecting part of the Carso, they had failed to secure either Monte San Michele at the N. end which dominated the plain of Gorizia or any of the southern heights towards

the Adriatic shore. In an attack on Gorizia it was necessary at the same time to take either the northern defences at Monte Santo or the southern at Monte San Michele, and Cadorna chose the latter. From Aug. 1, the Italian guns bombarded the whole front from opposite Monte Santo to the Adriatic. On the 4th the Italians feinted from Monfalcone with the object of drawing Austrian reserves to this part of the line preparatory to the real attack on San Michele. The Bersaglieri (*q.v.*) carried two hills, but suffered severely from asphyxiating bombs left by the Austrians in their trenches, and an Austrian counter-attack soon drove the Italians back to their original line, though Cadorna's purpose had been served in that the Austrians moved reinforcements to the Monfalcone section. On Sunday, Aug. 6, the Italian bombardment was resumed with great intensity in front of Gorizia; the Austrian front position was destroyed and the Italian 3rd Army under the Duke of Aosta began their advance. On the left, the Italians carried Monte Sabotino by storm and, before dark, reached a line within half a mile of the riv. On the right of this section the Italians stormed the strong position of Oslavia, and further S. they advanced against Podgora; but this position was held with desperate bravery for two days by scattered Austrian detachments, one point being held by an Austrian major with forty men with such bravery that, when they were finally overpowered, the Italian commander ordered his men to present arms to the prisoners. The Gers. so consistently disparaged the fighting value of the Austrian troops that it is worth recalling that both against Italy and Russia certain Austrian troops exhibited a valour unsurpassed even by Ger. troops on any front. The Italian centre operating against the San Michele positions had made equally substantial gains. The Austrians here again offered a desperate resistance; but slowly the Italians forced their way to the key points and by Tuesday, the 8th, Cadorna held all the heights on the western bank of the riv. and the key point of San Michele on the E. bank. On the morning of the 9th the main Italian army crossed the riv. and entered Gorizia, while the cavalry pressed eastwards. Already the Italians had taken over 12,000 prisoners and the Austrian casualties were in the neighbourhood of 80,000.

The Advance on Trieste and Capture of Gorizia.—The Italian offensive now entered on its second stage,

which had for its objective the capture of Trieste. The first move aimed at driving the Austrians from the Vallone. On Aug. 10 the advance began, and, by the 12th, the whole of the western end of the Carso was in Italian hands. Cadorna continued to press forward into the Carso and occupied the village of Oppacchiasella, the hill of Nad Logem and positions on the W. side of Monte Pecinka. N.E. of Gorizia, the Italians took Tivoli and thus established a footing on the slopes of Santa Caterina. It was, however, necessary for the Italians to reorganise after so rapid an advance, and from Aug. 15 the pace slackened. The gains were substantial. Gorizia and the Gorizian plain had been won, and the most vital part of the immensely strong Austrian positions in the Carso, while the whole Isonzo defence system had been shattered. Between the Italians and Trieste lay a difficult country, but one lacking the intensive defence system of the Isonzo fortifications. The Carso, in particular, was probably the strongest natural defensive system in Europe—waterless rock, with intense heat by day and intense cold at night, and so fortified by the Austrians as to seem almost impregnable. The fall of Gorizia aroused intense enthusiasm in Italy. The reluctance to declare war on Germany had already been undermined by threats, and moreover Ger. munitions and Ger. officers had co-operated in the Austrian attacks, so that at length the way was clear for Italy to declare war on Germany, which she did on Aug. 28, 1916. No movement E. of Gorizia could be successful unless the ridge of Monte Santo were won and the Carso carried, and each was a formidable operation requiring for success full concentration of troops. The next movement was undertaken in the Carso, when on the morning of Sept. 14 a great bombardment began between the Vipacco and the sea, followed on the same day by an Italian advance. There was desperate fighting round Nova Vas, but no decisive gains had been made by the 17th. The Austrians had been occupied in digging new trenches, and in the Carso these were in many cases blasted out of solid rock 6 ft. deep, faced with sandbags and protected with steel shields. The Italians were also much hampered by thunderstorms and heavy rain, which made observation from the air impossible, and it was not until Oct. 10 that another attack was made. This was successful in straightening the front, and 5000 prisoners were taken. On

the 11th the Italians carried the hill of Pecinka and reached the outskirts of the villages of Lokvica and Hudi Log. On the 13th in bad weather a further advance was made to the Gorizia-Prvacina road; but a succession of great gales dislocated the advance, and finally compelled the Italians to withdraw to a line a little behind Pecinka, Lokvica and Hudi Log. For a fortnight heavy rains continued, and the first cold of winter began to be felt. On Oct. 30 an intense bombardment started, the greatest yet employed in the Carso, and on the morning of the 31st the Italians again advanced with considerable success. On a front of more than 2 m. between the N. edge of the Carso and the Oppacchiasella-Kostanjevica road the Austrian line was shattered, numerous batteries were captured together with 5000 prisoners; but the advance had created a considerable salient, and on Nov. 2 the Austrian batteries shelled the new Italian positions with appreciable effect. An infantry attack followed on the next day, but it failed and the Italians again advanced taking another hill and the crowning position on Fajti Hrib, which commanded the village of Kostanjevica and also the road across the plateau. Advance towards the S. was still blocked for the Italians by the formidable defensive system of Hermada, a great hill full of concealed batteries which covered the road to Trieste. To take this position meant a great concentration of guns, but meantime winter came on and, although all through December Cadorna waited for open weather, it did not come and by Christmas he was compelled to postpone further advance until the spring. Italy had conducted a brilliant campaign for four months; but she was now at war with Germany as well as with Austria, and the Italian High Command realised that 1917 would see an even greater struggle. Accordingly all through the winter the work of strengthening the Italian positions for the new campaign continued, in spite of Arctic conditions which enhanced the intense difficulty of all such work.

(xiii.) **THE RUSSIAN FRONT IN 1916.**—*Russian Advance on Pripet-Pruth Line.*—It is now necessary to return to the Russian front, where, during the spring and summer, events had been taking place which had directly affected the Austrian plans on the Italian front. On the Russian front in the late autumn of 1915 it was clear that the great Ger. offensive begun in the spring, successful as it had been, had failed

of full effect. By the beginning of December the situation in the Balkans made it necessary for Russia to undertake some stroke which would divert a possible drive by the Central Powers into Bessarabia (*q.v.*). Ivanov (*q.v.*) planned to attack Czernowitz in order to cover the Rumanian border and began his advance on Dec. 24, but before he could attain his object heavy snow began to fall and the movement came to a standstill in the middle of January. It had, however, been useful to the Allies in bringing Mackensen northward to meet it and so reducing the pressure in the Balkans. Three months of normal trench fighting followed, with a Russian offensive in the Lake Narotch dist. in March, the effect of which was more than countered by a rapid Ger. advance over the same ground in April, when the Russians, for lack of heavy artillery, suffered very heavy losses. A great simultaneous summer offensive by the Entente in the W., on the Isonzo and on the Russian front, which was planned for the summer of 1916, was delayed first by the fighting at Verdun, and secondly by the Austrian advance in the Trentino. Russia was not ready for her part in this offensive; but, when it became clear that Italy might be overwhelmed if the Trentino attack succeeded, Russia arranged for a preliminary movement to relieve this pressure. Ivanov had been recalled from his command of the southern Russian armies in April and had been succeeded by Brusilov, the most experienced in actual fighting of all the Russian generals. Austria had depleted her defences in Galicia for the Trentino adventure, because she did not believe that Russia could so soon take the offensive again. But on June 3 the Russians opened a bombardment along the whole front between the Pripet and the Pruth, and on the 4th the Russian advance began. By June 6 General Kaledin (*q.v.*) was at the gates of Lutsk (*q.v.*), the headquarters of the Austrian army commander, and the Archduke Joseph Ferdinand was compelled to withdraw. By June 16, Kaledin had advanced some 50 m., had captured Lutsk and Dubno, had reached the Galician frontier and was within 25 m. of Kovel. He had taken some 70,000 prisoners, 53 guns, and great quantities of war material. But after this date, formidable Ger. and Austrian reinforcements began to arrive. Ludendorff himself was sent by Hindenburg to restore the position, and four Ger. divisions were rushed from France in as many

days. Kovel was the danger-point, for its loss would cut communications between the Ger. army of the centre and the army of the S. Von Linsingen, who had been brought to the Volhynian front, opened his counter-offensive on June 16, but he did not receive the reinforcements he expected owing to the Russians having attacked on the centre N. of Baranovitchi, a nodal point on the Ger. railway system between Vilna and Brest-Litovsk. Meanwhile, in the S., the Russians under Lechitsky had made another effective advance. By June 13, after nine days' fighting, they had taken 38,000 prisoners and 49 guns, and on the 17th entered Czernovitz.

Austrian Retreat to the Carpathians.—The Austrians were in full flight towards the Carpathians. By the 23rd the Russians had taken Kimpolung, the most southern tn. in the prov., and the whole of the Bukovina was once more in their hands. By an extraordinarily brilliant series of operations Brussilov had made great inroads both in Volhynia and the Bukovina; but the salient in Volhynia had to be flattened to make the advance really valuable. Early in July the Russian General Lesch carried out another effective advance which secured the right flank of the Volhynian salient, and took him to the banks of the Stokhod R. with 12,000 prisoners and 45 guns among his captures. Kovel was now only some 20 m. distant, but the intervening ground was difficult and it was obvious that von Linsingen would employ every man he could to defend so important a position. Brussilov discovered von Linsingen's plans for a counter-offensive on the S. of the Russian salient, and anticipated it by sending Sakharov to advance towards Brody. After bloody battles he reached and took the tn. on July 28, taking in this movement some 13,000 prisoners. But Sakharov did not rest and by Aug. 10 he had completely turned the flank of the opposing troops. Meanwhile Lesch and Kaledin had made further attacks and won the whole line of the Stokhod R. Lechitsky in the S. also continued to make rapid progress, and, by the end of June, he had seized the important railway centre of Kolomea. Heavy rains delayed his further advance, but on Aug. 10 his right wing occupied Stanislaw. The extraordinarily rapid series of Russian successes led to a complete re-organisation of the Central Empires' commands. Most of the Austrians were replaced by Gers. (See also BRUSILOV.)

(xiv.) IRISH REBELLION.—BATTLE OF JUTLAND.—*The British Military Service Act.*—To return to events in the W. In Britain, the Military Service Act was giving rise to some difficulty on account of the exemptions from service granted to men in 'essential' occupations. Many single men were granted exemption on somewhat slender grounds, and the married men who were called up for service naturally resented this. Not until a considerable tightening up of the regulations was effected did the Act work smoothly, and for a time the calling up of married men had to be discontinued until the manifest injustices were remedied. In deference to the views of Quakers and certain other religious bodies with a traditional opposition to all war, an exemption on the grounds of 'conscientious objection' was included in the Act.

The Irish Rebellion.—What was potentially a greater danger to the British campaign was the Easter Rebellion of 1916 in Ireland. From 1910 to the outbreak of the War British mismanagement of the Irish problem had gone from bad to worse. A Home Rule Bill had been introduced which was suspected of being rather a party move than a genuine effort to improve relationships, and when the predominantly Scottish pop. of Ulster organised armed revolt against it, the British Gov. neither suppressed the Ulster Volunteers, as they were called, nor withdrew the Bill. The Nationalists of Southern Ireland accordingly organised their own armed bands, the National Volunteers. On the outbreak of the War the truce between the Ulster and Nationalist leaders had not been accepted by the wilder spirits in Southern Ireland, and Germany had made unceasing efforts to stir up revolt among the more extreme Nationalists, and particularly among the members of the organisation known as Sinn Féin (*q.v.*), which had been founded some fifteen years earlier on a policy of boycott of British goods, passive resistance to British interference in Ireland, and the development of the Irish language and Irish crafts and industries. During the War this movement attracted certain elements with directly separatist aims by armed revolution if need be. Of these were formed the Irish Volunteers, whom the gov. at Dublin Castle did nothing to suppress. Sir Roger Casement (*q.v.*), an Irishman of distinction with an excellent record in the British Consular Service in the tropics, had identified himself with this movement, and

during the War went to Germany with the object of enlisting readily promised Ger. support for an armed rebellion. An idealist with the virtues and the defects of his type, he seems to have genuinely believed in the unselfish motives of the promises he received of Ger. support; but the promises were never kept and it is obvious that they had been made only in the hope of embarrassing Britain. Germany did, however, provide one vessel, disguised as a Dutch merchantman, and one submarine, which arrived off the coast of Kerry on April 20, 1916. The 'merchantman,' laden with arms, was stopped by a British patrol boat, and sank herself to avoid capture, her crew being taken prisoner; while Casement and two companions were landed from the submarine. The Sinn Féiners failed to meet them, and Casement was arrested on Good Friday morning, the 21st, and taken to England. The capture of Sir Roger Casement upset the plans of the other rebel leaders; but they had already gone so far that it was decided that the rebellion must continue, and on Easter Monday, the 24th, the rebels seized St. Stephen's Green, the Law Courts, the Post Office and part of Sackville Street. Troops were brought from the Curragh, while a gunboat on the Liffey shelled the rebel headquarters, and on Wednesday reinforcements arrived from England with Sir John Maxwell, who took command of the British troops. Gradually after desperate hand-to-hand fighting the rebels were driven out of their positions, and by May 1 the revolt had been crushed in Dublin and the local revolts in the country dists. were dying down. Fifteen of the leaders were tried by court-martial and shot, while a number of others were condemned to varying terms of imprisonment. Sir Roger Casement was tried for high treason and executed on Aug. 3. These reprisals, however, justified by the necessities of war, were to have after-effects in the most bloody civil strife Ireland had ever seen; but for the time being the effect of the rebellion on the British conduct of the War was entirely negligible, and Germany had secured nothing from her participation in it. It was but another tragic episode in the troubled history of Anglo-Irish relations.

Battle of Jutland.—Early in the morning of April 10, 1916, the Ger. High Sea Fleet suddenly put in an appearance off the Eng. coast, when Yarmouth and Lowestoft were bombarded, and during May they awaited

favourable weather for another raid, partly in the hope of luring the British Grand Fleet within range of their submarines. In the early morning of May 31, the Ger. fleet put to sea again, and the British Grand Fleet set out to meet them. Chance brought the Ger. battle-cruisers under Admiral von Hipper into contact with Admiral Beatty's combined fleet of battle-cruisers and fast battleships at about 2.30 in the afternoon off the coast of Jutland, when Admiral Jellicoe, the British Commander-in-Chief, with the main fleet, was scouting some distance to the N. At about a quarter to four the action began at long range between Beatty's six battle-cruisers and four fast battleships (with light craft in support) and von Hipper's five battle-cruisers (also with various light craft). In spite of his advantage in numbers, Beatty suffered the first and also the most serious losses in this part of the battle, which was afterwards known as the Battle of Jutland. His flagship, the *Lion* and also the *Tiger*, were both hit twice, and the *Lion* caught fire and blazed for some time. A little later the *Indefatigable* was blown up by the Ger. *von der Tann*, and sank with all hands, and before long the *Queen Mary* was also sunk, blowing up under water. Meanwhile, the British fast battleships came into action, and also the destroyers, two of which, the *Nestor* and *Nomad*, were wrecked, and afterwards sunk by the Ger. battleships which came up under Admiral von Scheer at about half-past four. As soon as the Ger. battleships appeared, Beatty turned N. to join Jellicoe. Contact was made soon after 5.30, and Jellicoe's ships came into the fight soon after. In the light cruiser action three of the Gers. were disabled. A confused fight continued with considerable damage to a number of the Ger. ships, and von Hipper's flagship, the *Lutzow*, caught fire and had to fall out of the line. The disabled Ger. cruiser, *Wiesbaden*, was attacked by the British cruisers *Defence* and *Warrior* under the fire of battle-cruisers and battleships, and the *Defence* was sunk; while the *Warrior*, almost in a sinking condition, was protected by a remarkable accident. The great fast battleship, *Warspite*, got out of control, and proceeded in circles, which happened to take her round and round the *Warrior*, and she continued to fire with every gun. Admiral Hood, of the First Battle Cruiser squadron, soon after went down in the *Invincible*, which had been caught against the light by two Ger. vessels. The deceptive light and thickening mist prevented the British Fleet from in-

flicting defeat on the Gers.; and though they had been severely 'hammered,' they had not suffered such heavy losses as the British. Soon after seven o'clock the Ger. High Sea Fleet received orders to turn away individually, and by nine o'clock the firing ceased with the complete disappearance of the Gers. in the mist. During the night, a number of scattered encounters took place between isolated units of the Ger. fleet and the British light craft, during which many ships suffered severely. In spite of these fights the Ger. ships ultimately escaped to their ports. Thus ended, inconclusively, the one great naval action of the War. In its effects the battle was a British victory from the Allied point of view, since it confined the Ger. fleet to port for many months for repairs, and certainly restrained the Ger. Gov. from ever risking another general action, when conditions might have been more favourable to the British heavy guns. The British seamen engaged in the battle, exhibited to the full the high quality of heroism that was part of their tradition; while the tactical skill of von Hipper was a notable feature of the Ger. attack; nor has any observer denied to the Ger. sailors both high skill in gunnery and equal determination with their opponents. (See also JUTLAND, BATTLE OF; STRATEGY AND TACTICS.)

Death of Lord Kitchener.—Soon after the Battle of Jutland Lord Kitchener, who was proceeding to Russia to confer on the coming Allied offensive, lost his life at sea. He was travelling with his staff in the cruiser *Hampshire*, which was sunk (presumably) by a floating mine off the western coast of the Orkneys on June 5, and only one or two survivors reached the shore. His death caused profound sorrow throughout the British Empire. During the Great War, he had been conspicuous in foreseeing the length of the War and in preparing to meet the drain it would make on British energy; but he did not show to best advantage in the intricate organisation and negotiation necessitated by a European war. His great talents as an administrator had been developed in the E. and the methods so learned were not those best suited to a war on a vast scale; but he was one of the greatest servants of the British Empire of all time and his prestige had steadied the nation at a most critical time (see KITCHENER).

(XV.) THE WESTERN FRONT (JULY-NOVEMBER 1918).—*Sir Douglas Haig appointed British Commander-in-Chief.*—Meanwhile Germany maintained a conciliatory attitude towards

the U.S.A., largely owing to the temporarily enhanced influence of Bethmann-Hollweg and his 'politicals,' who were beginning to regard the future rather more anxiously than the extreme war-party in Germany, and were determined to prevent the frustration of their plans by the possible intervention of the U.S.A. on the side of the Entente. But the Chancellor, in his speeches, did not encourage any general feeling that there was any lessening of belief in Germany in the hope of victory; for example, in regard to Belgium's future after the War, he said, 'Germany cannot again give over to Latinisation the long-oppressed Flemish race.' We have seen that the simultaneous offensive on three fronts had been delayed by the Austrian advance in the Trentino, and on the W. by Verdun, while the Russians had taken the offensive early in order to divert troops from the threatened points on the other fronts. In this purpose they had been successful, for, between June and September, no fewer than sixteen divisions were withdrawn by the Gers. from the Western Front and one from the Balkans to meet Brussilov's attacks, while the Austrians diverted seven divisions from Italy, and even the Turks sent two. On the Western Front the British had taken over since the beginning of the year a considerable part of the line from the Fr., and at the beginning of the year Sir John French had been recalled and replaced by one of his former corps commanders, Sir Douglas Haig.

Allied Military Conference; Allied Economic Conference.—The first general Allied Military Conference took place in Paris in May, and there, for the first time in the War, was prepared a common plan of campaign. At an Allied Economic Conference in Paris in June it was resolved to co-ordinate the Allied economic systems, to prohibit their subjects from trading with the enemy directly or indirectly, and to prohibit the export to neutral countries of certain articles which might be re-exported to enemy countries. Further engagements were entered into for the period of reconstruction after the War, and certain permanent agreements for preferential treatment between the Allies were made, with a number of restrictions on the trading activities of enemy countries after the War. This Allied Economic Conference was the reply to various expedients attempted by the Central Powers to improve their now perilous economic position. The Ger. Gov. was under the necessity of raising further internal loans on the strength of the

Jutland 'victory,' and they knew that if the Ger. people realised the real position Germany's financial situation would be increasingly difficult, while her prospects after the War, if all hope of a crushing victory for her arms had to be abandoned, would be disastrous. An illustration of Germany's attempt to convince her own people that her enemies had no compunction was the shooting, in July, of the British Captain Fryatt, whose steamer, the *Brussels*, plying between Harwich and Holland had been captured in June. He was condemned to death as a *franc-tireur* on the ground that, when attacked by a Ger. submarine, he had defended himself by trying to ram the submarine, and the Ger. Press described the execution as necessary for the protection of 'honourable and chivalrous combatants against perfidious and murderous attacks.'

The Battle of the Somme (1916).—The plan for an offensive on the Western Front involved a joint advance by British and Fr., at the point on the Somme where their lines joined. The attack was to be made on a front of 25 m. from Gommecourt, half-way between Albert and Arras, to Fay, 5 m. N. of Chaumes. The object of the offensive was to drive the Gers. N. towards the coast, and so make it impossible for them to continue to hold the southern part of the great salient. But the Gers. had not been idle during the winter, and they had made, in the Bapaume ridge, vast underground chambers, which no artillery could destroy, and these were to be mainly responsible for the failure of the Allied offensive to achieve its object. The Battle of the Somme began on July 1, after a preliminary bombardment since June 24. The attack by the British part of the line had been anticipated by the Gers. and in the northern part little progress was made; but further S. Mametz and Montauban were taken on the first day, and the Fr., on their part of the line benefiting from the element of surprise, reached the outskirts of Hardecourt and Curlu, N. of the Somme, while, S. of the riv., they captured Dompierre, Becquincourt, Bussu, and Fay, with some 6000 prisoners. On the 2nd, the British took Fricourt, while the Fr. took Frise, Curlu, and Herbecourt. The British encountered severe opposition on the following days, and secured only small gains after intense fighting; but the Fr., S. of the Somme, made good progress, reaching on the 9th the village of Biaches, only 1 m. from Péronne. On July 14, the second stage of the battle opened with a British attack from Contalmaison to

Trônes Wood. A successful advance was made, the Gers. being driven out of Bazentin-le-Grand and le Petit and out of Trônes Wood. At the same time, a great advance was made to High Wood (Bois des Fougères) and the Gers. were driven out of most of Longueval and Delville Wood (*q.v.*); but much of this ground could not be held and it took many days to secure several of the points reached on this day. Small advances were made during the remainder of July, and on August 4 the Australians began an advance from Pozieres (captured on July 26) to Mouquet Farm and the windmill which commanded the summit of the Bapaume Ridge. The ground was fiercely contested and it was only after many days of severe fighting that it was won. During August, the Fr. improved their position N. of the Somme and finally took Maurepas on the 24th. September showed better results for the Allies. On the 3rd, in a general attack, Guillemont was carried, and the Fr. carried by storm Le Forest, Cléry, and the Ger. lines up to the outskirts of Combles. On the 5th the British entered Leuze Wood between Guillemont and Combles, and captured Falfemont Farm to the S. The Fr. continued to advance both N. and S. of the Somme, and on the 9th Ginchy was captured by the Irish regiments which had taken part in the capture of Guillemont. Thus at last the Allies were beginning to move; but it had taken over two months to secure points intended to have been taken in the first few days of the battle. The third stage of the battle, in the Ancre area, opened with a preliminary attack by a brigade of Gough's Fifth Army on the 14th, which stormed the Hohenzollern trench and a strong redoubt (*see HOHENZOLLERN REDOUBT*), and diverted attention from the real attack on the 15th. In this attack, for the first time the British made use of a new weapon, the Tanks, heavily armoured cars of new design running on 'caterpillar' wheels and capable of surmounting practically any obstacle. The Tanks spread devastation in the Ger. lines and the results of the day exceeded expectations. Courcellette fell to the Canadians, Martinpuich to the Scots, and Flers to the New Zealanders. High Wood was at last enveloped, and Delville Wood was taken by a division of the New Army, which pushed towards Lesbœufs. But the Guards were unable to carry Lesbœufs and Morval, which were the most important objectives of the day. Between the 13th and 18th, the Fr. conquered a larger area, took Bouchavesnes across the Péronne-

Bapaume road, and, S. of the Somme, took Berny, Vermandovillers and Deniécourt. On the 18th the British mastered the 'Quadrilateral' field fortifications E. of Ginchy and prepared the way for the advance which took place on the 25th, when Lesbœufs and Morval fell; the Fr. took Rancourt, and on the Ancre Gough's army unexpectedly captured Thiepval. On the 26th the Fr. and British movements finally secured Comblès. Bad weather then set in, and the Gers., who had already begun to prepare what became known as the famous Hindenburg Line (*q.v.*), far in the rear, were enabled to cling to the Bapaume salient until such time as they should carry out an orderly retreat. During October further progress was made, the Fr. capturing Sailly and Sailles N. of the Somme, and, S. of the R., Ablaincourt, Le Pressoir, Fresnes, Villers-Carbonnel and Barleux; while, on the Ancre, the British captured Le Sars and the 'Stuff' and 'Regina' redoubts between it and Thiepval. Early in November the British captured the strongly fortified position of Beaumont-Hamel (*q.v.*) and on November 14 they took Beaucourt; on the 17th they made another advance, to the Bois d'Hollande, N. of Grandcourt, while Canadians from the 'Regina' trench secured a position near its western outskirts. These successes opened up another route towards Bapaume, but the oncoming winter postponed any further advance, and the costly struggles on the Somme and the Ancre came to an end. (*See SOMME, BATTLE; ANCRE, BATTLE.*) In casualties these battles had probably cost the Allies almost as much as Verdun had cost the Gers.; but there was every reason to suppose that even equal losses on both sides would end in favour of the Allies, since their total reserves would be greater than the Gers.

French Attack at Verdun.—But the Somme and Ancre battles did not quite exhaust the Entente offensive on the W., for on Oct. 24 the Fr. made another attack at Verdun. General Nivelle (*q.v.*) entrusted the attack to General Mangin (*q.v.*), who by the vigour of his attack took the Gers. by surprise and, from Fleury to Fort Douaumont, positions which had taken the Gers. months to win were recovered in a few hours. On the Fr. right progress was slower, but on Nov. 2 and 3 first Fort Vaux and then the villages of Vaux and Damloup were recaptured. On Dec. 15 the Fr. gained still greater successes, capturing Vacherauville, Poivre Hill, Hardoumont Wood, and Louvemont on the left, Chambrettes Farm and

Caurières Wood in the centre, and Hardoumont Wood and Bezonvaux on the right. To the N.E., the Gers. had been driven back almost to the positions from which they started in Feb., although to the N. they still retained some of their gains, and the Fr. counter-offensive did not extend W. of the Meuse; but enough had been done here and on the Somme to make the Gers. uneasy concerning the prospects for 1917, and to make them think of peace overtures.

(xvi.) THE COLLAPSE OF RUMANIA.

—As seen in a previous section, the Rumanian armies under von Falkenhayn's pressure were in full retreat early in Oct. from Transylvania, though Mackensen had been temporarily forced back in the Dobrudja. The retreating Rumanians offered strong resistance to von Falkenhayn, whose efforts to advance from the central Carpathian passes towards Bucharest during Oct. were defeated. Von Falkenhayn was no more successful against Moldavia, and, when Nov. arrived with the likelihood of snow blocking the passes, he had advanced no more than some 4 m. into Rumanian territory. But by Oct. 20 Mackensen, who had received reinforcements, broke the Russo-Rumanian line, and, on the 21st, cut the railway between Constanza and the bridge over the Danube at Tchernavoda. Constanza was abandoned on the 22nd, its stores of oil and wheat being burned, and on the 25th a span of the Tchernavoda bridge was blown up by the retreating Rumanians, while the Russians hastily withdrew 35 m. to Babadagh. Here, on Nov. 1, Sakharov arrived to assume the command with several new divisions, and a counter-offensive began. On the 9th he recaptured Hirsova, and, by the 15th, had advanced to within 7 m. of Mackensen's lines defending the Constanza railway. But his advance came too late, for the Rumanian defence was collapsing in the western salient. Von Falkenhayn had now transferred his main attack to the Vulcan Pass, still further W., though he still maintained his pressure down the Aluta valley. But S. of the Vulcan Pass his troops on Oct. 27 suffered a severe reverse at the hands of General Dragalina at Targul Jiu. This Rumanian general, however, died of his wounds after the battle, and with fresh reinforcements the Gers. continued their advance, and, by Nov. 21, entered Craiova on the main Rumanian railway, thus isolating the western Rumanian armies. On Nov. 23, Mackensen forced the passage of the Danube between Samovit and Sistovo, and by the 27th he had

effected a junction with von Falkenhayn, whose army had now swung E. across the Aluta and was advancing on Bucharest. In spite of an attempt by General Averescu, the Rumanian Commander-in-Chief, to repeat the tactics of the Marne and so save the cap., Bucharest fell on Dec. 5, and for the rest of the year the Gers. continued their brilliant progress eastwards, until the Russo-Rumanian forces found a line where they could make a stand—a line formed by the Danube, the Sereth, and the Putna, ascending to the Oitos Pass. Sakharov had been forced to withdraw from the Dobrudja, and all that was left of Rumania was its Moldavian prov., less than one-third of the kingdom. The Rumanian Court and Gov. established its temporary cap. at Jassy, near the Russian frontier.

Allied Advance into Serbia.—Sarrail's campaign in the S. provided inadequate compensation for the Rumanian disaster (see SARRAIL). The British contingent with the Salonika force, under General Milne (q.v.), had taken over the front from the Vardar eastwards past Lake Doiran and along the Struma R. to the sea, and was given the rather thankless task of pinning the Bulgarians to that sector and preventing them reinforcing the line in the W. The British were therefore confined to isolated raids which did not result in any permanent gains. The serious offensive undertaken by Sarrail was towards Monastir, and the Serbian army played the principal part in it. The Bulgarian offensive from Monastir in Aug. had penetrated a long way within the Gk. frontiers, and threatened to turn Sarrail's flank by an advance to the Gulf of Salonika when Sarrail began his own attack on Sept. 7. The first serious fighting took place to the W. of Lake Ostrovo, where, on the 14th, the Serbians captured Ekshisu. On the 20th they stormed Mount Kaymakchalan and recovered a footing on their own territory. On the 29th the Serbian general Mishitch descended the mountains towards the bend of the Tchernia R., and, by turning the flank of the Bulgar-Ger. army, forced it back beyond the Gk. frontier. By Nov. 15, although delayed by bad weather, Mishitch had mastered the river-bend and thus outflanked the enemy's left, so that they were compelled to retreat from Kenali to Bistriza, 4 m. from Monastir, when the Fr. and Russians again attacked. By the 19th the Serbs were threatening the line of retreat from Monastir to Prilep, and accordingly on that day the Bulgars evacuated Monastir.

The Allied position was further improved towards the end of the year; but Monastir marked the limit of their advance, and was continually subject to bombardment for another two years. Thus Sarrail's campaign had failed to effect a diversion in favour of Rumania; but it had secured Greece from Bulgarian attack and Greece was to prove of value to the Allies in the years that followed.

(XVII.) MR. LLOYD GEORGE AS PRIME MINISTER.—*Criticism of the Government.*—In Great Britain towards the end of the year there was increasing irritation over the conduct of the War. The halt on the Somme, the collapse of Rumania, and the failure of Sarrail were all laid at the door of the British Foreign Office and War Office. The rise in the price of food and the apparent failure of the gov. to undertake the necessary methods of controlling supplies gave rise to the fear of famine. It was also felt that the British air organisation was faulty, although the autumn had seen remarkable successes by the British aeroplanes against Zeppelin raiders over Britain, Zeppelins having been brought down in flames on Sept. 2 and 23, Oct. 1, and Nov. 27. The Admiralty was criticised in connection with the renewed Ger. submarine campaign and raids on the Channel flotilla. In the main, however, criticism was due as in other countries to the general feeling that the War was lasting much longer and proving more expensive in lives and material than anyone had anticipated, and there was a natural tendency to blame the gov. for faulty leadership. Towards the end of Nov. Mr. Asquith decided to reduce the War Committee of the Cabinet in numbers; but Mr. Lloyd George threatened to resign unless more drastic changes were undertaken. On Dec. 5 Mr. Lloyd George resigned, and the same evening Mr. Asquith himself resigned. Mr. Bonar Law was invited to form a Ministry but was unable to do so, and Mr. Lloyd George then undertook the task. He became Prime Minister on Dec. 7, and incorporated in his Cabinet a number of business-men who were to undertake the expert control of various departments. Mr. Lloyd George brought to his office qualities markedly antithetical to those of the late Prime Minister—immense energy, versatility, and an aptitude for political strategy. But if Mr. Asquith was manœuvred out of office in circumstances which might be excused on the ground of intense national anxiety, he had, while in office, shown a loyalty and a tenacity of purpose which had proved valuable in the greatest of crises. Similar

signs of restlessness were apparent in most of the other belligerent countries at about the same time. In France the late M. Briand was faced with a series of stormy secret sessions. He created a War Committee on the lines of the small War Cabinet of five people which Mr. Lloyd George now created in Britain, and Nivelle succeeded Joffre as Commander-in-Chief on the Western Front. In Austria the Premier was murdered in Oct. and his successor compelled to resign in Dec. At the end of Nov. also the aged Austrian Emperor Francis Joseph died, and his great-nephew, the Archduke Karl, who succeeded to the throne, was able to give no more security to his ministers. In Germany Bethmann-Hollweg's tenure of office was ending permanently; while in Russia a great disaster was dawning.

(xviii.) THE GERMAN PEACE NOTE.—*Political Situation in Russia.*—When the Duma met on Nov. 14, the reactionary gov. of Stürmer was fiercely attacked, and M. Milukov, the leader of the Cadet Party, did not hesitate to accuse the Premier of corruption and intrigue with Germany. Stürmer resigned, but was given a High Court appointment. He was succeeded by M. Trepov, an honest man and a patriot, who had done good work as Minister of Communications; but he was handicapped by being compelled to retain Stürmer's principal lieutenant, M. Protopopov, at the Ministry of the Interior, and no general confidence could be reposed in any ministry in which he held a portfolio. The army and the nobility were now definitely hostile to the Imperial Gov., which depended entirely on the support of the corrupt officials surrounding the Tsar. Germany now tried to enlist the inhabitants of the occupied territory on the Eastern Front in her support. On Nov. 5 she announced that, in conjunction with Austria, she proposed to establish an independent Poland with an hereditary monarchy and a constitution. The proposal, obviously designed to secure Polish recruits and embarrass Russia, failed of its purpose, and few of the better type of Polish patriots would have anything to do with it, while it temporarily stiffened the resistance in Russia even of those elements inclined to show sympathy towards Germany. In Dec. Germany began her first attempt to manoeuvre the Allies into peace. She was becoming apprehensive of the future, with the Allied power growing to ever greater proportions; she had to consider her own people, who had been told that they

were fighting for self-defence and might well now be given the impression that Germany, although victorious, was willing to forgo any idea of revenge; and she had to consider the neutrals, especially America, who had suffered greatly from the War and might therefore be expected to give sympathetic consideration to that Power which should first suggest peace; and, finally, she was especially anxious that the world should accept her own valuation of her territorial gains as evidence that in spite of the fact that she was winning the War, she preferred, in the interests of humanity, to bring it to an indeterminate close. In the Notes which the Ger. Chancellor announced in the Reichstag, on Dec. 12, that he had sent to the belligerent Powers, the emphasis, necessary for the Ger. people, on the suggestion that Germany was now victorious in a war forced on her by her enemies was less convincing to some of the neutrals. It was, moreover, an empty offer, for it specified no terms which Germany would be willing to accept, and these terms could only be deduced from the implicit arrogance of the general statement. On Dec. 30 the Fr. Gov. communicated to the U.S. Ambassador in Paris a formal answer, signed by Russia, France, Great Britain, Japan, Italy, Serbia, Belgium, Montenegro, Portugal, and Rumania, in which they declared that there could be no peace until Germany offered reparation, restitution, and guarantees for the future.

(xix.) INTERVENTION OF THE U.S.A.—*Effect of the British Blockade on American Trade.*—On the outbreak of the War in 1914, feeling in the U.S.A. on the part of a considerable element was sympathetic towards Germany. In commerce, in scientific invention, and to some extent in racial connection (there were perhaps 12,000,000 persons of Ger. descent in the U.S.A.) relations had been particularly friendly. Moreover, the gov. of the U.S.A. was bound by the traditional American policy of avoidance of entangling alliances, which dated from the time of Washington, and had been again emphasised in Jefferson's watchword, 'Peace, commerce, and honest friendship with all nations; entangling alliances with none.' The Monroe Doctrine embodied this policy, and at two Hague Conferences America had reasserted it. Ten years previously there had appeared to be a nascent imperialism in the U.S.A., but her experience in the Philippines had caused a reaction. Early in the course of the Great War, however the U.S.A. began to

realise that she was going to be seriously affected by the actions of the belligerents. The first difficulty arose over the British Maritime policy. At the outbreak of war, Great Britain had announced her intention to abide by the Declaration of London, made in 1909, which contained provisions Britain soon found herself unable to abide by. Among these were the article which made it easy to break any blockade (*q.v.*) limiting the right of a blockading Power to capture a blockade-runner, and the articles which exempted from capture belligerents travelling in a neutral vessel, or which permitted a belligerent warship to destroy a neutral vessel without taking it to a port for judgment. Presently successive British Orders in Council altered the Declaration of London (*q.v.*) beyond all recognition, and the altered conditions were found to interfere with American shipping. The cotton and lumber interests of America were gravely handicapped, and the American export of copper to neutral countries, which had suddenly increased fourfold, was interfered with by British warships, who seized American copper in neutral vessels unless it was clearly proved that it was not intended for Germany. America protested, and she had indeed considerable grounds for protest on account of the wavering British attitude towards the Declaration of London, which made it difficult for neutrals to appreciate their position. But even thus early in the War the inept Ger. diplomacy in the U.S.A. to some extent counterbalanced ill-feeling against Britain. The Ger. Ambassador in Washington, Count Bernstorff (*q.v.*), was personally popular and had married an American woman; but the vast bureau of information which he set going and his efforts to cultivate the American Press with the assistance of Bernard Dernburg (*q.v.*), a former Ger. Colonial Minister, were so imprudently conceived that they soon had the effect of antagonising rather than conciliating American feeling towards Germany. Early in 1915, as we have seen, the new Ger. submarine policy in answer to the British blockade (by which Germany proposed to use submarines against British merchantmen and to destroy enemy merchantmen in British waters 'without its always being possible to warn the crew or the passengers of the dangers threatening') aroused further ill-feeling against Germany in America, for Germany had warned the U.S.A. that neutral ships might

be sunk during the submarine campaign. By the middle of 1915, the position of America was still more difficult. President Wilson's policy of neutrality was based upon a reasonable view of American interests; but Germany seemed determined to make neutrality difficult, by such outrages as the sinking of the *Lusitania*, which drew a strong protest from the U.S. Gov. Mr. Bryan, the Secretary of State, resigned because he disapproved of the terms of the protest, but Germany emphasised the justice of the protest by her defiant reply, which led to a further exchange of Notes, that presented by Mr. Bryan's successor, Mr. Lansing, in the middle of July, being particularly stiffly worded. It laid down three principles: that the high seas are free to neutral ships, that this freedom can only be interfered with after the character and cargo of the ship have been ascertained, and that the lives of non-combatants can only be lawfully endangered if the vessel tries to escape after being called upon to stop or attempts resistance. The Note further stated that a repetition of the breaches of these principles of which Germany had been guilty would be regarded as an unfriendly act. A few days later Ger. submarines sank an American steamer off the Orkneys; but the U.S. Gov. still took no more decisive action, partly because her relations with Britain, in spite of much goodwill on both sides, were also reaching an *impasse* over the blockade of Germany declared by the British Gov. in March 1915. The blockade laid down the new claim to seize and confiscate non-contraband goods of Ger. origin, ownership, or destination carried in neutral ships to neutral ports, which was a breach of the accepted principles of international law, but justified by Great Britain on the plea of necessity in face of the exceptional circumstances created by Germany's methods. America's great cotton trade was seriously hampered by this claim, and during the summer the U.S. Gov. addressed a series of strong protests to the British Gov. It was obvious that the British attitude would have to be modified in some way, and several suggestions were made for a solution of the difficulty, the first being that Britain should declare cotton contraband on the ground that it was now a vital element in the preparation of high explosive, and a second, that neutral states should be rationed in their supplies of cotton according to a pre-War average.

President Wilson's Policy—Effect of Ger. Submarine Campaign—The 'Lusitania.'—Feeling in Great Britain at this period was becoming somewhat impatient with America, public opinion being unable to grasp the reasons for American neutrality. It was not sufficiently realised that in the U.S.A. no President can afford to take action in advance of an all-powerful public opinion, and President Wilson was undoubtedly right in his interpretation of that public opinion as being in favour of neutrality, at least in the early years of the War. His critics recalled his academic career, as president of an American college, and criticised him for applying academic theories to governmental problems; but his judicial quality had undoubted value in steering the U.S.A. safely through extraordinary difficulties. His Notes to Germany and Britain and his public statements doubtless tended to emphasise his aloofness from the practical outlook, as, for example, his famous statement that there was such a justifiable attitude as that of being 'too proud to fight.' During the summer of 1915, the Gers. continued to provide the U.S.A. with severe tests of their neutrality. The sinking of the *Lusitania* (q.v.) was the event which aroused the American people to a true understanding of what Ger. methods of maritime warfare might mean to them, and, on Aug. 19, the sinking without warning off Cape Clear of the White Star liner *Arabic* increased their anger, for twenty-six Americans were among the passengers. The Ger. Gov. claimed that the *Arabic* was a British ship going to America for a cargo of war materials and carrying gold to pay for them; secondly, they claimed that she had been mined and not torpedoed; and finally that, if torpedoed, it was because she had tried to ram the submarine after notice had been given to her to stop. A week later Count Bernstorff informed Mr. Lansing that full satisfaction would be given to America for the sinking of the vessel, and Herr von Jagow, the Ger. Foreign Secretary, announced that Germany had now adopted a new policy which would clear up the submarine difficulty. This policy consisted of a declaration that liners would not be sunk by submarines without warning and without ensuring the safety of non-combatants, provided that the liners did not try to escape or offer resistance. This undertaking was welcomed in America, although it was obviously liable to grave abuse, because no submarine could ensure

the safety of all the passengers in a liner even if its commander so desired. Count Bernstorff was able to make good use of the changed feeling in America by an appeal to the U.S.A. to help Germany in bringing the War to a close. He represented that Germany wished to settle the submarine controversy with this aim in view. It was, however, of ill augury for their plans that on Sept. 4 another liner, the *Hesperian*, was torpedoed without warning. The vessel did not sink immediately, and was towed towards port, but foundered on the 6th. There was small loss of life, but among the crew were two American citizens. It was clear that Ger. assurances could not be relied upon, and that some excuse on the ground of special circumstances would always be found for every breach of an agreement. American irritation was not allayed by the official Note on the sinking of the *Arabic*, which was handed to the American Ambassador in Berlin on Sept. 7. It contained an incredible allegation that the liner had deliberately attacked the submarine, and stated that even if the commander had made a mistake the Ger. Gov. could not recognise any obligation to make reparation.

German Agents in America.—But relationships were being still further strained by extraordinary revelations about the activities of Ger. agents in America. For a long time there had been rumours of secret activities of Ger. agents financed by the Ger. Embassy in Washington. It was alleged that there had been deliberate falsification of passports, particularly by the Ger. Naval and Military Attachés, Captain Boy-Ed (q.v.) and Captain von Papen, and that dynamite outrages in Canada and various incendiary fires in U.S.A. factories had also been organised from Washington. During August the *New York World* pub. information proving that Count Bernstorff had control of immense funds for propagandist purposes and that Ger. agents were fomenting strikes in American munition works and urging the Imperial Chancellor to prevent the dispatch of goods purchased in Germany by American manufacturers so that the default might be attributed to the British blockade. These interferences with American internal affairs were brought to a head by the Dumba Case, made public early in September. On Aug. 30, the steamer *Rotterdam* touched at Falmouth, and the British authorities seized a number of confidential papers and letters in the possession of an American journalist called

Archibald. Among the documents seized was one from Count Bernstorff on the subject of the highly compromising revelations (referred to above) which had been made by the *New York World* from the contents of a portfolio lost on the New York Elevated Railway by Dr. Albert, the Financial Adviser to the Ger. Embassy, on July 31. In his memorandum, Count Bernstorff denied that Germany had tried to organise strikes or to 'take part in a plot against the economic peace' of America. Archibald's dossier contained communications from Dr. Dumba, the Austro-Hungarian Ambassador in Washington, and from Captain von Papen, which exposed the falseness of Bernstorff's case. Dr. Dumba's previous career had been somewhat unorthodox, for he had first been heard of as an *agent-provocateur* in the Balkans, and he frankly explained his application of the same methods to American industry in the documents seized. One of his dispatches to the Foreign Minister at Vienna contained a full description of the efforts he had made to stir up unrest among munition workers. This was dated Aug. 20, two days after Count Bernstorff had sent his official denial of such activities to Mr. Lansing. 'It is my impression,' he wrote, 'that we can disorganise and hold up for months, if not entirely prevent, the manufacture of munitions in Bethlehem and the Middle West, which, in the opinion of the Ger. Military Attaché, is of great importance, and amply outweighs the comparatively small expenditure of money involved. Even if the strikes do not come off, it is probable that we should extort more favourable conditions of labour for our poor down-trodden fellow-countrymen. In Bethlehem, these white slaves are now working for twelve hours a day for seven days a week. All weak persons succumb and become consumptives.' He implicated the Ger. Embassy by mentioning that a private Ger. registry office had been established to employ Ger. skilled workmen who might be induced to leave the munition factories. Finally, he described, in some detail, the methods of employment of Ger. and Hungarian workers who would join the factories and work in secret among the other workers. Dr. Dumba's previous dispatch had itself supplied all the evidence needed. Captain von Papen's dispatches disclosed that Ger. agents had bought up large quantities of war material, besides revealing various activities in espionage, while a private letter contained references to the 'unfortunate'

publication of items from Dr. Albert's portfolio. The undiplomatic language used in this communication further inflamed American opinion, already considerably stirred by these exposures of duplicity among the Ger. and Austrian diplomats. The U.S. Gov. was compelled to take action, and demanded the recall of Dr. Dumba. The Austrian Gov. attempted to avoid his recall, but the U.S. Gov. handed him his passports.

American Note on Allies' Maritime Policy.—The slightly better feeling between the Ger. and U.S. Govs. induced by the Ger. disavowal of the sinking of the *Arabic* was reflected in President Wilson's Note of protest against the Allied maritime policy issued on Nov. 5. Although informed opinion in Britain realised that such British regulations as that making liable to capture enemy merchandise even in neutral ships was in conflict with previous international agreements, as also was the revised British definition of contraband, it was generally felt, in Britain, that the necessities of the case justified British action, particularly in view of the care exercised to avoid giving unnecessary offence to neutrals. It was further pointed out that the Northern Gov. in the American Civil War had itself claimed that international law must change with changing circumstances; but the American Note was founded strictly on the letter of existing international law, and indeed even purported to explain away conflicting decisions of the American Supreme Court in the Civil War. It was, however, by the general claims made in the Note that the President aroused most criticism in Britain. His claim that neutrals possessed 'a general right to enjoy their international trade free from unusual and arbitrary limitations' appeared to minimise war-time conditions; but most criticism was provoked by the concluding words of the Note: 'This task of championing the integrity of neutral rights, which have received the sanction of the civilised world, against the lawless conduct of belligerents arising out of the bitterness of the great conflict which is now wasting the countries of Europe, the United States unhesitatingly assumes, and to the accomplishment of that task it will devote its energies, exercising always that impartiality which from the outbreak of the War it has sought to exercise in its relations with the warring nations.' British comment on this utterance was to remind the world that every principle of inter-

national law and neutral right had been shattered in Belgium without protest from the U.S.A., yet now, almost ironically, the U.S.A. became the champion of neutral rights.

Republican Party's Attitude.—Against this, however, must be set the fact that up to the end of 1915 President Wilson represented the great body of American opinion in his determination to keep out of any entanglement in the Great War; but from that time onward the opposing party in the U.S.A., headed by ex-President Theodore Roosevelt and Mr. Elihu Root, steadily gathered strength. From the first, Roosevelt had advocated a stronger policy, not at first of intervention, but of emphatic protest against Ger. breaches of international principles in Belgium and elsewhere. 'One outspoken and straightforward declaration by this gov. against the dreadful iniquities perpetrated in Belgium, Armenia, and Serbia would,' said Roosevelt, 'have been worth to humanity a thousand times as much as all that the professional pacifists have done in the past fifty years.' Mr. Root, an ex-Senator, who had been Secretary of State under Roosevelt, also expressed the view of this party in the U.S.A. in a speech on Feb. 15, 1916, to the Republican Convention in New York City. There he stated that 'the American democracy stands for something more than beef and cotton and grain and manufactures; it stands for something that cannot be measured by rates of exchange and does not rise or fall with the balance of trade,' and he went on to lay down the principle that 'peace and liberty can be preserved only by the authority and observance of rules of national conduct founded upon the principles of justice and humanity; only by the establishment of law among nations, responsive to the enlightened public opinion of mankind.' Even vigorous statements such as this took time to alter the attitude of the American people. The U.S.A. was a mass of peoples of every race, often ill-assimilated to any general feeling of unity, and the one absorbing interest of the different races was the continuance of the prosperous times brought to commerce and industry by the war orders from the belligerents. Before the War, the American economic situation had been indifferent, and many businesses were on the verge of ruin; but with the advent of war in Europe, these suddenly found themselves soaring to unexampled prosperity. Germany in the Note of Nov. 5 saw hope of a breach between

America and the Entente, and when, on Dec. 7, the President's Message to Congress denounced Ger. intrigues in America and asked for legislation to deal with them, Germany hastened to repudiate the campaign carried on by her agents in America, and followed this with an offer of settlement of the differences over the sinking of the *Lusitania*. Having now, as she thought, pacified American opinion, Germany formulated a new demand in Feb. 1916, when she announced that, from March 1, she would treat all armed merchantmen as belligerents and attack them at sight. She warned neutrals that they would travel in such armed vessels at their own risk. This was an unjustifiable claim, because no submarine could tell whether a vessel was armed until she had searched, and therefore the probability was that unarmed ships would suffer equally with armed. This proved too much for President Wilson's pacific temper, and on Feb. 15 his Cabinet rejected the *Lusitania* proposals and refused also to admit the Ger. claim to torpedo armed merchant vessels without warning. The President pointed out that acceptance of a single abatement of American rights, as in this instance, would involve further concessions, and that America could not yield such concessions 'without conceding her own impotency as a nation, and making a virtual surrender of her position among the nations of the world.' In the early part of March 1916 Grand Admiral von Tirpitz resigned his position at the Ger. Admiralty on the grounds of ill-health, which was generally understood to mean that his resignation had been secured by the Chancellor and his party, and the sensation caused by his retirement was partly due to the expectation that the Chancellor was about to secure the reversal of the unrestricted submarine warfare instituted by Tirpitz. Probably von Bethmann-Hollweg intended to do so; but so greatly had the necessity of the submarine campaign been impressed on the Ger. people that change was found to be impossible, and it was announced that the practice of sinking armed merchantmen would continue. Two Dutch liners were torpedoed without warning and on March 24 a submarine sank the Channel steamer, *Suseer*, with a number of American citizens among the victims. Washington asked for an explanation, and Germany replied by questioning the origin of the disaster; doubts which the U.S. Gov. was soon able to dispel. On April 19 President Wilson

made a speech in Congress indicting the whole Ger. policy of submarine warfare, which had been embodied in a Note to Germany dispatched on the previous day. In this speech he declared that 'warfare of such a sort, if warfare it be, cannot be carried on without the most palpable violation of the dictates alike of right and humanity.' He concluded with the declaration that 'unless the Imperial Gov. should now immediately declare and effect an abandonment of its present methods of warfare against passenger and freight vessels, the gov. can have no choice but to sever diplomatic relations with the gov. of the Ger. Empire altogether.' This ultimatum drew from the Ger. Gov. the reiterated plea of self-defence against the illegal conduct of Great Britain, but drew also the concession that such vessels should not be sunk without warning unless they attempted to escape or offered resistance. Although this was merely a repetition of the assurances given in the previous autumn, it was accepted by the U.S. Gov. as a specific abandonment of the policy of unrestricted submarine warfare.

American Presidential Election.—

During the summer of 1916, the relations of America with the belligerents remained quiescent largely because foreign affairs were overshadowed by the Presidential election, in which Mr. Wilson, standing for his second term of office, was to be opposed by Mr. Hughes, backed by Roosevelt and the Progressives. Mr. Wilson, whose great appeal to the electors was that he had kept America out of the War, did not wish to involve himself either with Germany or the Allies until the elections were over. Both sides wished to appear as representing exclusively American interests and neither side wanted to alienate the considerable Ger. vote. It may be mentioned here that during the summer a Note of protest was handed by the American Ambassador in London to the British Gov. against an extension of the British 'Black List' to certain American traders. The Black List was a list of firms in neutral countries known to have traded with the enemy and with whom British traders were forbidden to have dealings, and the British Gov.'s reply to the American Note denied that there was any interference with the trading of American firms, and averred that there was only a restriction against British subjects dealing with firms supplying the enemy. During the autumn of 1916 Germany, as stated in a previous section, began to pre-

pare the way for peace overtures. On Dec. 18, President Wilson himself issued a Note which had been prepared before the Ger. peace overture was issued. The President had been re-elected to a second term of office in Nov., and was now in the strongest constitutional position possible for an American President, because he could ignore future electoral chances when considering his policy. A majority in the Presidential election had assured him of the support of his countrymen, and in this Note he took the opportunity of stating the aims claimed by both Allies and Central Powers in the War and of asserting the expressed willingness of both sides to accept a League of Nations to avoid future wars. He then invited each side to set out in detail their views, so that 'soundings' might be taken to find out how near to the attainment of peace the nations might be. The Allies accepted the President's statement of their aims and expressed their adherence to the ideal of a League of Nations. Germany made no official reply, but issued various statements claiming that the Allies had now 'dropped the mask' and admitted their 'lust for conquest.' The good reception given in America to the Allied reply showed that the President had been wise in thus compelling each side to consider its ultimate aims. He had foreseen the necessity of American intervention on the Allied side and desired to make clear what were the terms on which America could take part in the War, as well as to test the nature of the Ger. assertions of a desire for peace. On Jan. 31, 1917, the Ger. Gov. announced that, as from Feb. 1, all sea traffic within certain areas adjoining Britain, France, and Italy, and in the eastern Mediterranean would 'without further notice be prevented by all weapons.' This meant clearly that Ger. submarines would sink at sight all vessels, belligerent or neutral, found in these areas. The reason adduced was the illegality of the Allied blockade and the rejection by the Allies of the Ger. peace offer. Bethmann-Hollweg, however, stated in the Reichstag that he had always been in favour of ruthless methods of submarine warfare, but that hitherto the time had not been ripe. Now the chances of securing a speedy victory by these methods were excellent, for Germany had built enough submarines, capable of long voyages, to lend the possibility of success to such a policy. American patience was at last strained to breaking point.

Diplomatic Relations between U.S.A.

and Germany Severed—Message to Congress.—On Feb. 3, the Ger. Ambassador in Washington was handed his passports and Mr. Gerard, the American Ambassador in Berlin, was recalled. On the same day the President announced to both Houses of Congress the severance of diplomatic relations with Germany. In his speeches he drew a distinction between the Ger. Gov. and people, and he said that he could not believe that the Ger. Gov. intended to take the steps they had warned America they felt at liberty to do; but he ended with a solemn warning that if American ships were sunk and American lives lost he would come again to Congress for power to take the necessary steps to protect American citizens. The immediate effect of the Ger. announcement was the prevention of American passenger ships from sailing to Europe, which emphasised the reality of the Ger. menace to the people of the eastern states, and the publication early in March of the terms of a suggested alliance between Germany and Mexico against the U.S.A., under which Mexico was to be given Texas, Arizona, and New Mexico, was sufficient to arouse the people of the American West. On March 12 the U.S. Gov. issued an order for the arming of American merchant vessels, and, quickly following this, Ger. submarines sank five American vessels. By this defiance, American feeling was aroused to the realisation that war was the only course open to the U.S. Gov., and, on April 2, President Wilson, at a special session of Congress asked for a declaration of war. His message to Congress outlined the practical steps which would be necessary to equip the nation to take part in the War actively, both in preparing her own contribution and in financing and equipping the Allies until America was ready to take part. In the concluding passage, he stated the principles upon which he felt that America should enter the conflict. 'The world must be made safe for democracy' was the phrase he used to sum up the American ambition as he saw it, and the phrase was to become famous both during the War as an inspiration and after the War as something of a paradox in view of the actual course of events. Under the Constitution, the right to declare war lay with Congress. In spite of a good deal of rather factious opposition, much of which was based on inherited distrust of European monarchies, the decision to declare war passed both Houses by April 6, on which date a state of war between America and

Germany came into operation. The outbreak of the Russian Revolution possibly removed the last scruples of those who had opposed the declaration, for it seemed that the last autocracy on the Allied side had now been replaced by a democratic régime. The entry of the U.S.A. into the War was of great immediate value to the Allies, for although any considerable contingent of American troops could not be sent to Europe for many months, the whole of the immense industrial organisation and financial resources of the U.S.A. became immediately available for the Allied cause. Above all, American participation on the Allied side made their victory certain, however long it might be delayed. The ideals with which President Wilson finally led his country into the War were also to have effects not to be measured by their apparent breakdown in the treaties concluding the War; for the ideal of a League of Nations, which he of all statesmen clearly expressed, was to survive the years of disillusionment after the War was over. The delays and apparent uncertainties in President Wilson's policy were now seen to have been justified, for he was able to secure the almost unanimous support of his countrymen for his policy of intervention, only because he had so clearly shown his determination to remain neutral so long as it was possible to do so consistently with the best interests of the U.S.A. Once the U.S.A. had entered the War, the U.S. Gov. lost no time in organising the nation for war.

Passing of Selective Service Act.—The first step was the passing by Congress on April 28 of a Selective Service Act, and in five months a million and a half men were in training at great camps erected with extraordinary speed at various points throughout the country. On June 25, 1917, the first contingent of American troops landed in France. Major-General Pershing (q.v.), a comparatively young man with a conspicuous record of service in the Spanish and Mexican wars, was appointed American Commander-in-Chief. Meantime, the American navy had already begun to co-operate with the British. In May, a flotilla of American destroyers arrived in British waters under Vice-Admiral Sims, and took part in the protection of Atlantic shipping. But perhaps the most vital contribution made by the U.S.A. during 1917 was the creation of new merchant vessels and war vessels to replace the tonnage sunk by the Ger. submarine campaign. Britain was so fully occupied with creating her

armies and securing munition supplies that she had been compelled to withdraw much of the labour used in peace-time for building new tonnage, though the loss of Allied vessels through the unrestricted Ger. submarine campaign had been immense in the first half of 1917. Since the announcement on Jan. 31 by Germany of blockaded areas in all the waters round Britain, France and Italy and in the eastern Mediterranean, the submarine campaign had been increasingly successful. During April, the Allies lost some 550,000 tons gross of shipping. After April the losses slowly decreased and in July the gross tonnage lost was no greater than 320,000; but in the first seven months of the submarine campaign the Allied losses amounted to some four and a half million tons, equalling the total Allied losses from the beginning of the War to the opening of the campaign in Feb. 1917. To meet the menace various methods were adopted. Home production was increased where possible, so that imports from overseas might be reduced. Essential shipping was protected as far as possible by providing escorts and arranging convoys (the system by which vessels travelled in company under escort of warships), and submarines (or 'U-boats' as they were familiarly known from the class of submarine mainly used for the war on shipping) were attacked with vigour and with increasing success. But still the most urgent need was the creation of new tonnage. It was the Ger. submarine campaign which had brought America into the War, and America was in the best position to solve the Allies' problem by replacements. The continual record of ruthless destruction of shipping with attendant loss of life had a great effect on the American public in stiffening their determination to take their part in the War. The torpedoing of hospital ships such as the *Gloucester Castle*, the *Lanfranc*, and the *Donegal* conceivably did more to arouse American opinion than the destruction of merchant vessels. From the beginning it was recognised that America must deal with the question of replacement. There was much delay before she began to build at a rate even approaching the six million tons of new shipping each year which was required if the scale of destruction by the Ger. submarines was continued. It was particularly necessary for America from her own point of view to undertake the task, because she would be unable to send her newly trained armies to France unless the necessary shipping were available for

their transport and supply. But by the beginning of 1918 this problem was solved. The magnitude of the task of converting an immense nation of many diverse elements from peace to war activity was discovered to be greater than had been imagined. The highly trained and expert staff of the American army took nearly a year to produce any really formidable addition to the Allied forces on the Western Front. It was, however, in the detached attitude of the U.S.A. that they rendered perhaps the greatest service to the Allied cause; for the broad lines on which President Wilson laid down American aims helped the Allies to clarify their own aims. His ideals were welcomed by the foremost Allied leaders as the only hope for the world. In a speech in May 1917, General Smuts made a great impression by his claim that the British Empire was the first instalment of a greater League of Nations—the only system in history in which a large number of nations has been living in unity.

(xx.) RUSSIA REVOLTS.—*Dawn of the Revolution.*—Meanwhile events were fast moving in Russia towards military disintegration and revolution. The revolution did not come suddenly and, for a time, it seemed as if first the reactionaries under Galitzin and later the provisional gov. of Prince Lvov and Kerensky would succeed in holding the Russian armies together on the Eastern or Russian Front. But famine was now playing its part in Russia and the feeling among the Russian people against their continued participation in the War—about the causes of which the great masses knew nothing—grew stronger day by day, fanned as it was by the Russian Council of Labour ('Soviet'). The Tsar Nicholas II. having abdicated, a provisional gov. was formed under Prince George Lvov, the gov. being a coalition of Left and Centre party groups. The provisional gov. appears without doubt to have made every possible effort to maintain discipline at the front and to prosecute the campaign; but its policy lacked clearness and insight, and, moreover, the extremists in Russia were losing no opportunity of seducing the allegiance of the soldiers, in whom, indeed, they found a ready prey, called upon, as they had been, to sustain the rigours of war under hopeless conditions. Miliukov, the Russian Foreign Minister, in the spring of 1917, sent a Note to the Allies affirming the determination of the Russian Gov. to conclude no separate peace but to pursue the

War to a victorious end. Soon afterwards, a Coalition Gov. was formed in Russia, with Kerensky (q.v.) as War Minister. This gov. also proclaimed its adherence to the Allied cause, but its assurances were based on the most frail foundation; for the determination of the newly-formed All-Russian Congress of Soviets was to obtain the Allies' acquiescence in the 'principles of the Russian Democracy' as a basis of peace. The Allied govts. had previously sent representatives to meet the new Russian Gov., among these being M. Albert Thomas of France, Senator Root of U.S.A., M. Vandervelde of Belgium, and Mr. Arthur Henderson of Great Britain. But the condition of things found by these delegates was far from reassuring, especially in view of the constant changes of the Russian High Command and the faith reposed by many in the forthcoming Stockholm Conference (q.v.). Yet even now strenuous efforts were made by the Russian military leaders. Brusilov himself with all his accustomed vigour worked out the plans for an offensive in Galicia, with the object of outflanking Lemberg. The Russian attack began on July 1, and at first prospered. By the evening of July 2, the Russians had made a considerable advance on the Gallician front and had captured some 18,000 prisoners. By July 10 and 11 the important tns. of Halicz and Kalisch had fallen to Kornilov's army. But this was the limit of the Russian success. Hampered not only by bad communications but by desertion and indiscipline, the Russians began to waver before the attacks of the reinforced enemy forces, and when floods were added to the Russian difficulties the rout began. On the 16th Kornilov was obliged to evacuate Kalisch and to retire all along his front. On that day disorder had broken out in the cap., and by the 20th Kerensky had hurried back to Petrograd to deal with it. On the 19th the Austrian counter-attack had developed; one Russian regiment deserted its position and, before evening, the whole front was in chaos. From the 21st to the 23rd, the advance of the Austrians continued so rapidly that they retook Tarnopol and wiped out the whole of the Russian gains of 1916. The Russian armies in Galicia had become a mob who shot down anyone who tried to restore order. Meanwhile, the preliminary sessions of the Stockholm Conference had taken place, with the result that a plenary session was suggested for August; but it soon became evident that the Socialists of the western European countries

were hopelessly divided, and no agreement could be reached. By the end of July the Russian armies in the S. were driven back to the frontier of Russia, where Kornilov made a desperate attempt to draw up a line of defence to protect the route to Odessa. There was no reason why the Austro-Ger. forces under Prince Leopold should not have pushed on to take Odessa; but they were content to let the internal disintegration of the Russian forces do their work for them. On August 2 Brusilov was dismissed from the supreme command and his place was taken for a short time by Kornilov.

Kerensky becomes Prime Minister.—Meanwhile, on July 16, the Bolsheviks in Petrograd, led by Lenin and Trotsky, and supported by the sailors from Kronstadt and by some of the troops, attempted to usurp power. But they were opposed by the Petrograd Soviet, and after some rioting General Polovtsov with some Cossacks restored order and Lenin went into hiding. Kerensky had now become Prime Minister in place of Prince Lvov; but his power was already weakening, and he was falling between the two opposing schools of thought in Russia, the growing force of Bolshevism and the more nationalist elements including the generals of the army, who wished to carry on the war. Kerensky made an effort to secure union between the opposing elements. He called a conference at Moscow, which included representatives of every known Russian organisation. He appealed for the revival of the army, and was supported by Kornilov. He was supported also by Kaledin (q.v.) for the Cossacks and by Alexeieff. The conference ended in apparent agreement, but in reality had no effect, for the extremists still continued their increasingly popular propaganda. Meanwhile the Gers. had moved, and by September 3 Riga had fallen. Alexeieff was sent to organise a hasty defence and the Gers. waited for the coming collapse. On September 7, Kornilov received a visit from Vladimir Lvov, acting as he thought for Kerensky, who urged him to become Dictator. Kornilov agreed, only to discover that on the 10th he was proclaimed a traitor by the gov. Meanwhile, General Krymov had been moving on Petrograd to resist a Bolshevik rising of which he had been warned by Kerensky's Minister of War. But by the time he reached the neighbourhood of Petrograd, Kerensky had assumed the position of Commander-in-Chief and put himself at the head of the Petrograd troops, so

as to play into the hands of the Bolsheviks rather than oppose them. Krymov saw that he had been betrayed and committed suicide. Kornilov handed over his command and was placed under arrest. Kerensky's motives remained obscure, but the more moderate members of his Cabinet felt that he had betrayed Kornilov and resigned. A new Council of Five took the place of the former gov. Towards the end of October the Gers. had advanced further so as to threaten Reval, and Kerensky was reaching his last days of power. He had developed an extraordinary self-esteem, which prompted him to go about attended by a brilliant staff and live in state in the Winter Palace. When, however, by October, Riga had fallen and the Gers. had advanced so far as to threaten Reval, Kerensky's power was on the wane and it was in vain for him to declare that if the revolutionaries persisted in their headstrong course Russia would succumb to alien tyranny. A new Council of Five had now assumed power and Trotsky had become President of the Petrograd Soviet, and it was the military skill of Trotsky which had prevailed in organising a garrison in Petrograd against Kerensky's gov. The primary object of the Bolshevik régime was now to get Russia out of the War, and having undermined the last vestiges of discipline in the Russian armies, they set to work to proselytise the masses of all countries so as to spread the gospel of proletarian dictatorship. Meanwhile they continued the negotiations for peace with the Gers.

Trotsky's Repudiation of the Allies—Brest-Litovsk.—Hostilities on the Eastern Front ceased on December 2, and fraternisation between the troops began. The Allied Powers formally protested and Trotsky seized the opportunity to make a fiery speech denouncing foreign interference. On the 3rd a Russian deputation arrived at the headquarters of Prince Leopold of Bavaria at Brest-Litovsk, and on the 5th a preliminary conference opened there under the presidency of General Hoffmann, Prince Leopold's Chief of Staff. The Russian delegates asked for the retirement of the Ger. detachments from the islands in the Gulf of Riga which they had occupied since the Revolution, and for a promise that no Ger. forces would be sent from the E. to other battle grounds. They urged also an armistice on all fronts alike. The Gers. refused this request, but finally, on the 15th, a truce was agreed to on the Eastern Front to last from Decem-

ber 17 for twenty-eight days. Trotsky issued a Note to the Allies declaring that if they refused an armistice they must declare the terms 'for which the peoples of Europe may have to shed their blood during a fourth year of war.' The suggestion could not be accepted by the Allies, but it was agreeable to Germany, who could at least secure stagnation on her Eastern Front and possibly sow dissension among the Allied peoples. The meeting at Brest-Litovsk to discuss terms of peace was formally opened on December 22. Von Kuhlmann (g.v.), the Ger. Foreign Secretary, and Count Czernin (g.v.) for Austria, were the principal representatives of the Central Powers. It was clear that while Kuhlmann was prepared to surrender nothing, he was open to any high-sounding declaration that might please the Bolsheviks. No less uncompromising was Trotsky's retort, 'We did not overthrow the Tsar in order to fall on our knees before the Kaiser and beg for peace. . . . We summon all to a holy war against Imperialism in every country.' In his eyes the negotiations were clearly the occasion for propaganda rather than for diplomacy, and the Gers. were continually being embarrassed by the activities of Bolshevik agents among their troops on the front. The Russians made seven principal proposals. Occupying armies were to be withdrawn from territories taken during the War, and there was to be no appropriation by force of any such territory. Complete political independence was to be restored to all peoples who had lost it during the War. Right of self-determination was to be given to all nations, with special safeguards for minorities. No indemnities were to be paid, war requisitions were to be returned and sufferers from the War compensated from a special fund to be levied on all the belligerents according to their resources. Colonies were to be treated on the same basis as parent countries and no economic boycott after the War was to be permitted. On Christmas Day, Count Czernin announced the readiness of the Central Powers to accept a peace without annexations or indemnities, provided that the Allies pledged themselves to these principles and agreed to join in the negotiations. The conference accordingly adjourned until January 4, 1918, so as to give the Allies time to consider the proposal. On December 28, an agreement was made allowing the resumption of normal diplomatic and consular relations between Russia and the Central Powers, and as a result Petrograd was at once flooded

with Ger. delegations. Meanwhile, the delegates of Germany and Austria had been preparing drafts for an eventual peace treaty with Russia. In the first draft they declared that as soon as the state of war was at an end and the Russian armies demobilised, the Central Powers would evacuate occupied Russian territory. In the second draft the qualification was introduced that the position of the border provs. was to be referred to a special commission, these provs. being Poland, the Ukraine, Finland, Lithuania, Courland, and part of Esthonia and Livonia.

The Baltic or Border Provs.—The Gers. claimed that in these provs. the people had already expressed their desire for separation from Russia and for Ger. protection. Germany was willing to see this preference ratified by a plebiscite conducted without military pressure. The Bolshevik representatives could not accept these suggestions, and their headquarters not only refused to accept them but immediately took a strong line against them, Trotsky in particular denouncing 'Germany's hypocritical peace proposals,' and declaring that if the border nationalities were not given the right of self-determination, the militant Revolution would defend them. It is necessary at this point to see what had been happening in some of the provs. concerned since the Revolution had overthrown the strong Central Gov. and had left the outlying regions of Russia more or less to their own devices. In Esthonia the Russian Provisional Gov. had established a National Diet, which after the Bolshevik *coup d'état* had proclaimed an independent republic in Esthonia. The Bolsheviks had then dissolved the Diet; but the local administration continued, and in January 1918 repeated its claim to independence. It represented a large majority of the pop., while a small minority of the pro-Ger. aristocracy was demanding the occupation of the country by Ger. troops to protect their landed estates. In Esthonia and Latvia there had for a long time been a strong movement in favour of an autonomous state under the Russian Empire, and after the Revolution there had been held a conference which had demanded autonomy under the Russian republic. In Lithuania there had been a similar movement for independence; but none of these movements were in favour of dominance by Germany. The demand for Ger. protection came in each case only from the same small minority of aristocrats, who feared any democratic form of gov.

whatsoever. In Poland the nationalist movement was not sufficiently definite in its own aims to secure respect from either side. Germany was ready to bribe any effective ally with a slice of Polish territory, while the Bolsheviks wished to give Poland self-determination, but were themselves opposed by the upper classes in Poland. The Ukraine was in a different position. Her inhabitants, the Little Russians, did constitute something approaching a separate nationality, and while they had agreed to accept autonomy under the Russian Provisional Gov., they did not accept the Bolshevik régime; but set up an independent republic establishing peasant proprietors in the land and with nationalist aims, to neither of which the Bolsheviks could agree. The new republic formed an alliance with Kaledin and the Cossacks, and also with Rumania and Bessarabia (*q.v.*). This Ukraine Gov. occupied Odessa, and in the N. and N.E. around Kharkov and Rostov there were numerous engagements with the Bolshevik troops.

The Ukraine and the Caucasus.—About the middle of December Trotsky sent an ultimatum to the Ukrainians, threatening war unless they ceased to bar the way to Bolshevik troops. The gov. of the Ukraine replied that they could not tolerate Bolshevik interference with their national gov., and Trotsky made the counter-charge that the Ukraine was supporting the *bourgeoisie*, the Cadets, and Kaledin against the Soviets and was therefore the enemy of the Republic. At the opening of the Brest-Litovsk conference the Ukraine was demanding representation as a sovereign state. Finland had received autonomy from the Russian Provisional Gov., but had continued to claim full independence, and Kerensky had dissolved the Finnish Diet just before his fall. The Finnish people had thereupon appointed an administration on their own account, which in December decreed separation from Russia. The Bolsheviks had tolerated this declaration, but the Finnish leaders being of the Right and Right Centre were exposed to the attacks of Left-wing agitators sympathetic to the Bolshevik régime across the border. Strife between 'Red Guards' and 'White Guards' had begun. In the Caucasus and in many parts of Siberia various separatist movements were also in progress, so that everywhere round the border the tendency was towards separate nationalism rather than international Bolshevism. On January 4 the period expired within which the

Allies were to accept or reject the peace offer. The Allies had made no reply to the proposal. On the 6th Trotsky himself went to Brest-Litovsk to deal with the difficult situation caused by his own statements. On the 9th von Kuhlmann announced that since the Allies had made no response the offer to negotiate had lapsed, thus compelling the Bolsheviks to negotiate a separate peace, which Trotsky agreed to do on the 10th, although he declared that he would only sign a 'democratic and just peace.' On the 11th, he agreed to the inclusion of a separate delegation from the Ukraine. On January 12, he laid before the Central Powers the Bolshevik proposals for the evacuation and reconstruction of the Russian territory now held by the Gers. The Gers. refused them, von Kuhlmann declaring that there could be no relinquishment till a general peace had been concluded. Germany was stiffening her terms as she already saw hope of peace with the Ukraine and with Rumania, which would give her access to the E., and she could then deal with the Bolsheviks at her leisure. On the 16th, in spite of Trotsky's protests, separate negotiations were begun between the Austro-Ger. delegates and the Ukrainians. On the 18th the conference was adjourned and Trotsky returned to Petrograd. On the 18th also the long-delayed Constituent Assembly was opened in Petrograd; but on the 19th it was dissolved by a body of Bolshevik troops. Trotsky, meanwhile, had sent an ultimatum to Rumania on January 15, and another on the 26th to the Ukraine. On the 30th the Brest-Litovsk conference was resumed, and Trotsky made one more appeal against the separation of the Ukraine, and against the Ger. policy with regard to the border provs. Meanwhile Bolshevik troops had taken Kiev and put the Ukrainian Gov. to flight. The Ukraine thereupon turned for help to the Central Powers and on the 9th peace was agreed upon between the Ukraine and the Central Powers, and the army of von Linsingen moved eastwards along the Pripiet to defend the Ukraine. Trotsky surrendered to superior force, and on February 10 announced that the state of war with Austria and Germany was at an end. Von Kuhlmann decided that as the Bolsheviks refused further negotiations they must be compelled to agree to the Ger. terms. Von Eichhorn was ordered to advance against them. He took Reval, Dvinsk, and Pskov and advanced within 150 m. of Petrograd, while von Linsingen relieved Kiev.

German Ultimatum to the Bolsheviks.

—An ultimatum was presented to the Bolsheviks, demanding acceptance of the Ger. terms, which had now been greatly hardened, within forty-eight hours. Lenin declared for surrender, and on March 3 the Bolsheviks were forced into signing the 'Peace' of Brest-Litovsk (*q.v.*). The Central Powers on March 5 had now also secured a treaty with Rumania and on the 7th a treaty with Finland. The treaty with the Ukraine had won for the Austro-Gers. a way to the grain areas of the Steppes, access to the Black Sea, and control of the Caucasus. The treaty with the Bolsheviks compelled Russia to evacuate Esthonia and Latvia, the Ukraine and Finland. The dists. of Ardahan, Kars, and Batoum were to be handed over to the Turks. The Bolshevik diplomacy, hailed by some people in the W. as the new 'democratic' diplomacy, had palpably failed, chiefly because it was founded on the assumption that the Bolshevik creed would spread to the people of other European countries and so enforce the terms they sought. The creed had not spread beyond the Russian border, and they had therefore nothing to offer the Gers. that the Gers. could not take of their own motion. Briefly summarised, the results of the Bolshevik foreign policy were that it had lost for Russia a quarter of her total pop., a third of her manufacturing industries, a quarter of her arable land, and some three-quarters of her iron and coal production. For the remaining Allies the so-called 'Peace' of Brest-Litovsk had the gravest results. Germany had not only disposed of the entire Eastern Front, with the consequent release for service elsewhere of the bulk of her forces on that front, but she had secured access to large new supplies of oil, foodstuffs and cotton, and had cleared the way to Central Asia, where she could do incalculable harm to the Allied cause, threaten India, and foment rebellion in Persia. For Rumania the Russian Revolution had been the last straw, involving as it did the defection of the Russian contingents. On December 6 she had been compelled to join in the truce, and on March 5, 1918, had had to make peace on the most humiliating terms. She had to give up the whole of the Dobrudja, the Petroseny coal basin, and the Carpathian passes, to demobilise her army, to allow Austro-Ger. transport to pass through Moldavia and Besarabia to Odessa, and a little later to subject completely the whole of her commerce including her oil-fields to the control of Austro-Ger. finan-

cial groups. (See also RUSSIA—History; RUSSIAN REVOLUTION.)

(xxi.) POLITICAL CRISES IN AUSTRIA-HUNGARY AND GERMANY.—*German Dream of 'Mitteleuropa' Realised.*—The overthrow of the old autocracy in Russia produced political crises both in Austria-Hungary and in Germany. For Allied observers the importance of Austria had been overshadowed throughout the War by her dominant partner; but although Germany had treated Austria's armies and their commanders with contempt, Ger. statesmen realised the vital importance of Austria to Ger. plans, and the danger to those plans if anti-Ger. influence should gain power in Austria-Hungary. Without the active participation of Austria-Hungary the Ger. dream of *Mitteleuropa* could not be realised, nor the vital plan of the *Drang nach Osten*, the creation of a solid block of territory under Ger. influence stretching from Berlin to Baghdad, by way of counterbalancing British sea-power. By the end of 1916, Germany, with Austrian assistance, had conquered Poland, Serbia, and most of Wallachia, and, with Turkey and Bulgaria as subordinate partners, the *Mitteleuropa* dream had become a reality. It was probably to secure themselves against any danger of Austrian defection that the Gers. had by this time completely broken up the Austrian armies as separate entities, and not only put them under Ger. commanders but associated them with Ger. troops in every theatre of war. Austria had least desire for war of all the associates of Germany and, in the first two years of war, had suffered very severely. Her armies had borne numerous defeats, and her people were on the brink of starvation, partly owing to the complete failure of the Austrian Gov. to make adequate distribution of food stocks among the poorer elements of the pop. Towards the end of 1916 observers among the western Allies had been inclined to hope for the conclusion of a separate peace with Austria; for feeling against Austria, particularly in Britain, had never been strong, while Hungary, since the days of Kossuth, had been almost a protégé of England. The Ger. hold on the Austrian armies was strong enough to make any such prospect illusory; but the internal condition of the Austro-Hungarian Empire was increasingly dangerous from the Ger. point of view. The numbers of people of different races and of different aspirations within the artificial empire of the Hapsburgs were a constant source of strife, increased by the dominant power exercised in Austria by some ten million Ger.-

speaking Austrians over more than eighteen millions of Czechs, Poles, Ruthenes, Croats, Serbs, and Slovenes, and in Hungary by less than ten million Magyars over eleven millions of Rumanians, Croats, Serbs, Gers., and Slovaks. Each state was governed by a parliamentary system in form, but in each state representation was so arranged that Austro-Gers. in one and Magyars in the other always held the upper hand, while, to make things doubly sure at elections, the minorities were, on the plea of preservation of order, by force prevented from recording their votes.

Problem of Oppressed Nationalities in Austria-Hungary.—The main problem of internal Austro-Hungarian administration was therefore the struggle of the other races against the minority Magyar-Ger. rule. Subject races like the Czechs and Slovaks, the Croats and Slovenes, the Rumanians and Italians, were hostile to Germany and in some cases were looking to their fellow-nationals across the borders of the empire for relief from oppression. It was therefore necessary for Austria-Hungary to mix soldiers drawn from these provs. with Ger. or Magyar troops and to send them to parts of her far-flung fronts remote from their fellow-racials. Not only the subject nationalities but the Austrian nobles themselves were in many cases anti-Ger. on account of the contumelies they had so frequently suffered from Ger. commanders and Ger. diplomats. The Emperor Karl, a young man of attractive personality, was believed to hold liberal views, and when a Bohemian noble, Count Clam-Martinic (q.v.), was appointed Austrian premier in Dec. 1916, it was thought that some compromise with the subject nationalities was intended. But it was soon evident that it would be impossible to carry through any substantial reforms in face of Ger.-Magyar opposition and the new Premier became involved in intrigue, into which the Russian Revolution brought further confusion. It was obvious that if Austria were to reach an understanding with the new rulers of Russia she must adopt democratic methods. Accordingly, after the Austrian peace offer to Russia on April 14, 1917, the Vienna Cabinet decided to summon parliament, which had not sat since before the War. It met on May 30, and at once embarrassed the gov. by pressing for the reality rather than the shadow of democracy. The Premier resigned and on June 24 a stop-gap ministry was formed under Dr. Seidler. Meanwhile in Hungary Count Tisza (q.v.) had fallen, but his successor

faithfully carried on Tisza's policy of co-operation with Germany, and the Ger. hold on Austria-Hungary remained as strong as ever.

Resignation of Bethmann-Hollweg as Ger. Chancellor.—In Germany the consequences of events in Russia were more startling. When, in May, the Chancellor had refused to state his peace terms, he had been supported in the Reichstag by a *bloc* of the Catholic Centre, the Radicals and the National Liberals; but in July this *bloc* went into opposition and joined the Majority Socialists in demanding reform of the Prussian constitution, parliamentary gov. throughout the empire, and a declaration of war aims on the lines which had just been laid down in a speech in the Reichstag by Herr Erzberger (*q.v.*), the leader of the democratic wing of the Catholic Centre Party. He had demanded a declaration in favour of peace without annexations and indemnities. The Emperor William hurriedly returned to Berlin, while the Crown Prince, Hindenburg, and Ludendorff were summoned from the front. On July 11 the Emperor offered direct and secret ballot for the Prussian Diet, but for a week the Reichstag continued to press its full demands. During that week Bethmann-Hollweg offered his resignation, which was accepted. The Chancellor had failed to control the Reichstag, and therefore had to resign unless the Emperor were to become a constitutional monarch. The majority in the Reichstag passed a resolution on war aims to the effect that the Reichstag stood for peace and understanding between parties and that annexations and political and economic oppression were contrary to such a peace; but the Emperor ignored the Reichstag in choosing his new Chancellor, Dr. Georg Michaelis, an almost unknown official who was believed by the Emperor's military advisers to be the safest choice, as likely to be both docile and efficient. But von Kuhlmann, who became Foreign Minister, was opposed to the military policy. During the summer and autumn of 1917 he showed much skill in trying to establish Germany's wish for peace both in Allied and neutral countries. At the same time he worked secretly in many directions to strengthen Germany's position and weaken Kerensky's position in Russia in the hope of bringing about the collapse of Russia's power. But while von Kuhlmann secured certain advantages for Germany by his adroit diplomacy his path was not made easy by the blunders of the Imperial Chancellor, who had failed to conciliate the Reichstag and continually

ruined the effect of von Kuhlmann's pacific overtures abroad by his reactionary statements on the success of the submarine campaign and the strength of the Ger. front.

Majority Socialists in the Reichstag — Fall of Ger. Chancellor Michaelis.—The errors of other Ger. diplomats also added to von Kuhlmann's difficulties. In the Argentine, Count Luxemburg made many blunders, while the abortive Ger. conspiracies in Mexico and elsewhere, which were periodically revealed by the U.S. Gov., did not enhance Ger. prestige abroad. In addition, von Kuhlmann was continually opposed by the military chiefs, whose influence in Germany was naturally considerably higher than that of the politicians. The High Command at least had served the country well and without corruption; but the civil administration was confused and corrupt, while war 'profiteering' on a great scale had been permitted. The collapse of all gov. in Russia, for which von Kuhlmann had worked, was really detrimental to his policy, for it gave fresh hope of 'peace by victory' to the reactionary military party, and revived the flagging hopes of the mass of the Ger. people. But the majority in the Reichstag were not content to allow their efforts at reform to be nullified, and when the Reichstag met again in Oct. the Majority Socialists interrogated the gov. on their encouragement of Pan-Ger. propaganda in face of the pacific speeches made by von Kuhlmann and the Austrian Minister, Count Czernin (*q.v.*). When gov. spokesmen tried to make light of the criticism the Reichstag as an expression of their dissatisfaction referred back a new war vote. The situation was aggravated by an Independent Socialist's reference to a mutiny in the fleet and coupled with an allegation of unjust treatment of the sailors by the gov. Admiral von Capelle was deputed to make a reply which had probably been prepared by the Chancellor, in which he averred that the mutiny had been organised in collaboration with Independent Socialist members of the Reichstag. This angered the Socialists, and the Chancellor first associated himself with von Capelle's charges and then called for his resignation. Finally the votes were passed and the Reichstag adjourned, but it was clear that Michaelis could not meet the Reichstag again, and the Emperor chose as his successor Count Hertling, a Bavarian of seventy-four years of age who had been a professor at the University of Bonn most of his life and the leader of the Catholic Centre

in the Reichstag. His appointment was not likely to be popular with the Socialists and Liberals, or in Prussia, since he was a devout Catholic, but von Kuhlmann assumed the task of conciliating the party leaders, though events in the field helped the forces of reaction once more, so that the reform movement subsided, and von Kuhlmann's pacific speeches were drowned in the new wave of popular enthusiasm for victory.

Effect of President Wilson's Insistence on the Principle of Self-determination.—Meanwhile President Wilson's insistence on the ideal of self-determination for oppressed nationalities was gaining ever wider acceptance as one of the main purposes for which the Allies were fighting, and not only among the Allies themselves but among the subject peoples of Austria and a number of other nations which had hitherto preserved neutrality. In Austria-Hungary movements for independence like the Czech national movement under Masaryk (*q.v.*) gathered fresh strength, and began to look to an Allied victory as the only hope of securing their aims. Abroad the ineptitude of Ger. diplomacy, and the continued interference with neutral shipping and supplies by the unrestricted submarine warfare, brought more and more nations into the War on the Allied side. Cuba declared war on Germany on April 7; Panama followed on April 10; Siam declared war on the Central Powers on July 22; China declared war on Germany on Aug. 14 and on Austria-Hungary on Sept. 11, and Brazil declared war on Germany on Oct. 26, while nine other countries had severed diplomatic relations with Germany. By the end of 1917 only the Argentine and Chile in S. America had not declared war on Germany. There was a strong movement in Spain for a declaration of war on Germany, but a powerful Germanophil party was able to prevent a declaration. The position of all the other European neutrals was becoming precarious since the tightening of the Allied blockade, and their people suffered more severely from food shortage than the people of any of the Allied countries.

(xxi.) **FOOD PROBLEM IN GREAT BRITAIN.**—*Food Ministry Created.*—The internal situation in Great Britain in 1917 may now be briefly considered. The great majority of the British people had responded uncomplainingly to the increasing sacrifices demanded of them, and the peace talk of the autumn had produced little effect on them; but the losses on the Somme and the remoteness of any prospect of the end of the War were beginning, to

affect the temper of the people, who, though still determined to prosecute the War, were feeling acutely the strain of war conditions. The problem of food supplies was becoming serious with the losses in tonnage from the submarine campaign and the diversion of much of the remaining tonnage to the transport of war material. In Nov. 1916, Mr. Runciman, President of the Board of Trade, had adopted a 'standard bread,' designed to utilise parts of the grain usually regarded as waste, and had imposed certain restrictions on meals served in restaurants. With the creation of a Ministry of Food in 1917 and the appointment of Lord Devonport as Food Controller, steps were taken to meet the serious shortage in the grain supply by a great number of orders, which culminated in the gov control of all the principal flour mills. Stocks of sugar, too, were small and during the first half of 1917 there was a great shortage of potatoes. In Feb. the Food Controller appealed to patriotic householders to adopt a voluntary scale of rationing, and a Royal Proclamation on May 2 urged a national campaign of food economy.

Limitation of Food Prices.—But the shortage was followed by high prices, attributed by the public to the 'profiteering' of large dealers, and the situation was not vigorously dealt with until Lord Rhondda took over the Food Ministry in June 1917. Lord Rhondda instituted an examination of traders' books, and a system of maximum prices for food stuffs based on this examination subject to weekly revision. Finally he instituted a compulsory system of food rationing, by which every civilian was supplied with a ration card on which alone he could obtain his weekly supply of meat, sugar, and other foods of which only limited supplies were available. The first financial measure of Mr. Lloyd George's new gov. was to raise a huge internal loan. The amount raised was £1,000,000,000 or £300,000,000 in excess of the provisional estimate of Mr. Bonar Law, the new Chancellor of the Exchequer. Vast sums were urgently needed, for the cost of the War was increasing at an alarming rate. By the middle of Feb. the average daily expenditure had risen to £5,790,000, and by June, the figure was £7,884,000. But the financial situation was not unsound, for the campaign conducted by the recently established War Savings Committee was producing good results in investments by munition workers and others who were receiving high wages.

(xxiii.) WESTERN FRONT (JAN.-APRIL 1917).—*German Retreat to the Hindenburg Line.*—On the Western Front during the first three months of 1917 the Allies compelled the Gers. to retreat to the strong defensive position they had prepared, known to the Gers. as the Siegfried Line but to the British as the Hindenburg Line (*q.v.*). By the end of the first week in April the Gers. had been driven back to this immensely strong position. On April 9 the British began their attack along the Vimy Ridge and in front of Arras (*see* ARRAS, BATTLE OF), and by the 13th they had taken the Vimy Ridge, a number of villages, together with numerous prisoners and much war material. A Ger. counter-attack on the 15th failed and on April 16 the Fr. launched a great attack on the southern part of the Hindenburg Line along the Aisne heights. Nivelle, the Fr. Commander-in-Chief, had for his immediate objective the southern pivot of the Hindenburg Line at Laon, while to the British had been given the task of attacking the northern pivot of the line around Douai and Cambrai. With entire self-confidence Nivelle undertook his offensive, but the offensive failed of its main purpose, which was to deal a decisive blow, and after the first few days was abandoned. The Second Battle of the Aisne (*q.v.*) lasted for a little more than a month, and although it used up a great many Ger. troops and endangered some important Ger. positions, it was really a failure. In the middle of May Nivelle was replaced in the command by Pétain, who reverted to the old tactics of gradual attrition. In the second half of the year the main fighting on this front was conducted by the British in Flanders.

The Third Battle of Ypres.—The Third Battle of Ypres, also known as the Battle of Flanders, consisted of prolonged operations lasting from the end of July to the beginning of Nov., in which the Canadians distinguished themselves in the capture of Passchendaele on Nov. 6. From Nov. 20 to 23 the British also secured considerable gains and many prisoners in an advance at Cambrai (*q.v.*). But the general results of the Flanders campaign were small in proportion to the effort, and the actual cost was greater to the British than to the Gers.

(xxiv.) NEAR EAST CAMPAIGNS (1917).—*Fall of Baghdad.*—In the Near East Allied prestige, which had waned in 1916, was much restored in 1917. The Allies realised that they must crush the Turks if they were to effect anything in the Balkans, and

during 1917 they took this task more seriously in hand in the hope of retrieving their previous blunders. The first movements took place in the Sinai Desert, where a British desert column during Oct. and Nov. 1916 had been feeling its way towards the important Turkish position of El Arish, which dominated the water supplies of the area. Large supplies had to be collected at the railhead of the line which the British had pushed out into the desert. By Dec. 20 all was ready for the attack on El Arish; but the Turks did not await the attack, and on the night of the 20th the British entered the deserted tn., which had been in the hands of the Turks for two years. On Jan. 9 the British captured Rafa, the last Turkish stronghold in the Sinai Desert. In Feb. an expedition against the Grand Senussi (*q.v.*) on the western borders of Egypt was completely successful and drove that potentate into the interior, where his forces could no longer menace Egypt on the W. In Mesopotamia, where Sir Stanley Maude had succeeded to the command of the British forces in Aug. 1916, great improvements had been effected in supplies, hospital arrangements, riv. transport and railway communication. The situation being complicated by the threat to India through Persia, as well as by the Turkish menace to the British position on the Tigris, the British commander decided to strike at the Turkish centre in Baghdad. No movement in this area was possible in the summer heat, and the cooler autumn days were occupied in perfecting arrangements for the advance. Early in Dec. the preparations were complete, and for the next two months the British steadily advanced, clearing the Turks from the right bank of the Tigris. In the middle of Feb. they attacked also on the left bank, and, having effected a brilliant crossing of the swollen riv. on Feb. 23, were in a position to cut off the retreat of the Turkish troops from Kut; but the attempt was unsuccessful. None the less, the continual advance along the left bank had so weakened the Turkish position that on the 24th the British forces entered Kut without opposition. The pursuit of the Turks was unremitting and by the 28th General Marshall had arrived at Azizieh, half-way to Baghdad. Since the crossing of the Tigris the British had taken some 4000 prisoners. On March 5, after a delay for reorganisation, the advance was resumed and the following day Ctesiphon was passed without resistance. On the 10th the Turkish position on the

Diala R. was captured, and on March 11 the British entered Baghdad. The fall of the city enormously enhanced Allied prestige in the East. It deprived the Central Powers of territory which had always been of essential importance to their eastern policy. It was a severe set-back both to the pride and the military strength of Turkey. Above all it was valuable in rehabilitating the British army in the eyes of the other Allied peoples, after the disasters of the earlier Mesopotamian campaign. During the remainder of March and throughout April Maude was occupied in securing his position by driving the various Turkish forces in the neighbourhood away from Baghdad. Although he made contact with Baratov and his Cossacks on the Persian borders, he was unable to prevent the escape of the Turkish 13th Corps from Persia, chiefly because the confusion caused by the Russian Revolution hindered effective Russian co-operation to this end. But by the end of April Baghdad was secure from enemy attacks, the terminal section of the Baghdad railway was in British hands and the nearest Turkish forces were 80 m. away. The communications of the enemy with Southern Persia were blocked and the threat to India removed. When the summer made further operations impracticable the British could afford to wait.

British Advance from Sinai.—Meanwhile Sir Archibald Murray continued his advance from Sinai, from the Wadi el Arish, to the Philistian plain. The desert railway was being pushed along the coast to form a British line of communication similar to the Turkish military line from Beersheba. At first it was thought that the Turks would offer resistance close to the frontier at the position which they had prepared at Weli Shaikh Nuran; but on March 5 British aircraft reported that they were falling back. Pursuit was impossible, for the British railhead was still too far to the rear, and the Turks took up their new position unhindered from Gaza to Tel el Sheria, with an advanced post at Beersheba on their left wing. The Ger. general, Kress von Kressenstein, who was in active command of the Turkish forces, had great difficulties to surmount. The Turkish people were thoroughly disheartened. Starvation and disease were general, and Syria had suffered more severely than other parts of the empire. The Lebanon and even Damascus were depopulated through famine. Supplies for the troops were hopelessly short, and desertion was common. And above

him the Ger. general had, as nominal Commander-in-Chief, Djemal, who was continually changing his ground, quarrelling with his fellow members of the 'Young Turk' Committee and with von Kressenstein. The British troops had now emerged from the Sinai Desert into the stony hills of Judah. It was essential to engage the enemy as soon as possible to prevent him falling back to stronger positions further N.; and Murray decided to advance up the coast, with Gaza as his objective, so as to keep in touch with the sea, secure better water supplies and leave an easier course for the railway to follow than would have been possible if an attack had been made inland towards Beersheba. The battle opened on March 26, but the early movements were hampered by a sea fog, so that the battle was still undecided when night fell. The British commander forbore to risk a night attack, and, as Turkish relief columns were approaching, he withdrew his troops to better defensive positions. For three weeks the British were occupied in advancing their railhead and in procuring proper supplies of water for the troops opposite Gaza, while the Turks under von Kressenstein were increased from about two divisions to five divisions of infantry and one of cavalry, and the defences of Gaza were considerably strengthened with new trench systems and great quantities of barbed wire entanglements. There was no longer any possibility of taking the Turks by surprise; but the whole of the British preparations had been made for an attack on Gaza and in the difficult country it was impracticable to revise the plans in the time available, so that Sir Archibald Murray now prepared for a frontal attack. The attack began on April 17, and with the assistance of tanks the outer line of defence was taken with but few casualties. The attack on the main position developed on the 19th, but no considerable advance was made and the British losses amounted to some 7000 men. Murray wished to renew the attack on the following day; but his army commanders disagreed, and urged him to await reinforcements. Thereafter the troops settled down to a long period of inaction, varied only occasionally by cavalry raids. Murray was then replaced by Sir Edmund Allenby.

General Allenby appointed to Command in Egypt and Palestine.—The check at Gaza was a serious reverse after the brilliant conduct of the Sinai campaign, and for the time it appeared that the British had reached a condition of stalemate similar to

that experienced in Gallipoli. The reverse was partly due to the difficulty of the country and partly to the release by the Russian Revolution of Turkish troops from the Caucasus, which had been transferred to Syria. When Allenby took over the command he was faced with the fact that von Falkenhayn was now at Aleppo with orders to restore to Turkey her lost territory, and accordingly the British must advance to avoid being driven from the positions already gained. It was also becoming more evident that the capture of Jerusalem must be the ultimate objective of the Palestine force, for, while Jerusalem had small military value, the capture of the Holy City would be a resounding triumph from a political standpoint. Allenby observed that Beersheba was practically an isolated fortress, separated by a considerable gap from the formidable main series of fortresses the Turks had now constructed from Gaza eastwards. He therefore determined to secure Beersheba first, since he would then be in a position to take the main fortresses in the rear. Meanwhile he proceeded on Oct. 27 to shell Gaza, so as to give the impression that he intended an attack in force on that city. The attack on Beersheba assisted by a cavalry enveloping movement from the N.E. was successful, and the town was occupied on Oct. 31, the garrison being put out of action and some 2000 prisoners and 30 guns being taken. Before developing the attack on the now exposed left flank of the Turkish defences at Gaza, Allenby began a frontal attack intended to draw off the Turkish reserves to that quarter. On Nov. 1 and 2 this operation was carried out with such complete success that Gaza was outflanked on the W. and a reserve division had to be sent to this front from the left flank. Water and transport difficulties now delayed Allenby's main attack; but by the 7th Gaza had fallen and the British troops were pursuing the retreating Turks up the coast. The enemy had suffered some 15,000 casualties, including over 5000 prisoners, and British airmen reported that the retreating Turks were so demoralised that they could not offer much further resistance. Allenby's main difficulty was to move his troops quickly enough to harass the enemy's retreat, for water was difficult to find and he was now again far in advance of his rail-head. On the 9th he occupied Ascalon, and through intense heat the troops struggled on towards the junction of the Jerusalem railway, which was captured on the 14th.

Fall of Jerusalem.—Jerusalem was now directly threatened, and frantic efforts were made to save that city. Enver himself coming from Constantinople to discuss plans for the defence. Allenby next seized Jaffa, but he was then compelled to call a halt, while he waited for the railway to be pushed nearer his rear, and so make his position secure. He was anxious not to attack Jerusalem directly on account of the danger to the Holy Places, but to conquer the city by an action at a distance, a plan which involved elaborate movements. On Nov. 22 the Turks suddenly began a series of vigorous counter-attacks, which continued until the end of the month and prevented the British from making much further advance. But the opportunity was taken to bring up the British guns and improve the roads for the final advance. Meanwhile Jerusalem was in confusion, and when the British attacked on Dec. 8 and 9 the Turkish civilians began to evacuate the city, and on Sunday, Dec. 9, the Turkish garrison retired and British patrols entered. On the 11th Allenby entered by the Jaffa Gate, and issued a proclamation affirming his intention to protect all the sacred buildings. He then quietly left the city. He had secured immense prestige with the Arab pop. on account of a centuries-old prophecy that a deliverer would come from the West who would bear the name of a Prophet of God, who would enter the city on foot, and would not appear till the Nile flowed into Palestine. Since his name was in Arabic 'the Prophet,' since he had entered the city on foot, and his soldiers had been living on water brought from Egypt, it seemed that Allenby fulfilled all the requirements of the prophecy, and the Arabs now became eager to co-operate with the Allies against the Turks. Meanwhile Sir Stanley Maude had been improving his position in Mesopotamia, and making it increasingly difficult for von Falkenhayn to begin any counter-attack; but before he could complete his work Maude died suddenly on Nov. 18 of cholera. His death was a heavy blow to the British cause, for he had in little more than a year completely changed the apparently hopeless British position in Mesopotamia to one which promised eventual victory. (See MESOPOTAMIA, OPERATIONS IN.)

(XXV.) THE BALKANS (1916-17).—*Revolt in Crete.*—It is necessary to return to the confused condition of affairs in Greece, where at the end of Aug. 1916 the Bulgars had seized considerable territory, the Gk. garrisons being sent to Germany.

This roused the Venizelist Party, and a revolution broke out at Salonika on Aug. 30 under Colonel Zimbrakakis, a Venizelist Deputy. Regiments were enrolled for service against Bulgaria and in Sept. a Gk. regiment was sent to the front. On Sept. 24 a sympathetic revolt broke out in Crete, Mytilene, and other Gk. islands, and Venizelos left Athens for Salonika, where he formed a provisional gov. of insurgent Gks. This gov., which was grudgingly recognised by the Allies, at once declared war on Bulgaria. The mainland of Greece, S.W. of Salonika, remained under Constantine's rule. The King's party formed leagues of reservists to oppose war, while the King continued to evade the demands of the Allies, which increased in severity to the surrender of the fleet and the disbandment of the army.

Allied Landing at the Piræus.—On December 1, 1916, detachments of Allied troops landed at the Piræus were driven off with loss. Allied diplomacy played into Constantine's hands, for the councils of the Allies were divided. France and Britain were keenly Venizelist; but the Tsar, fearing revolutionary movements, was lukewarm, and Italy feared the emergence of the greater Greece for which Venizelos was working. At the beginning of 1917 the gov. in Athens was, in appearance, in a more reasonable frame of mind. They had made penitent gestures for the outrage on the Allied troops, and the Gk. troops were moved to the Peloponnese according to the Allies' demands. But there were still violent outbreaks and other indications that intrigue was active. Meanwhile the authority of Venizelos grew, and additional islands declared for him. By the end of May he had some 60,000 troops at his disposal. The attitude of the Allies towards Constantine stiffened. They had no longer to fear any ill effect in Russia if they dealt sternly with him, for the Revolutionary Gov. had no sympathy with him, while Italy's attitude was changing on account of the liberty of action which had been granted to her on the Adriatic seaboard. Early in June events moved swiftly.

Albanian Independence Proclaimed.—On the 3rd Italy proclaimed the independence of Albania under her protection, and on the 8th she occupied Janina, thereby cutting the last open line of communication between Greece and the Central Powers. On the 6th M. Charles Jonnart arrived at Salamis in a Fr. warship as High Commissioner for Greece appointed by the Allies. From Salamis he continued his journey to Salonika to

co-operate with Sarraill and Venizelos. On the 10th Fr. and British troops entered Thessaly, partly to safeguard the harvest and partly to occupy certain strategic points, like Volo and Larissa, Sarraill having long suffered from the attacks of irregular bands of reservists in his rear. On the 11th Fr. troops seized the Isthmus of Corinth, and that evening Jonnart arrived at Athens, accompanied by Allied transports. He summoned Zaimis, the Prime Minister, to an interview on board his warship. Jonnart told Zaimis that the Allies intended to purchase the Thessalian crop and to distribute it equitably among all the Gks. provs. He also stated that the Allies were now compelled to seek more satisfactory guarantees for the safety of the army at Salonika, and that these could only be found in the restoration of unity in Greece and the revival of true constitutional gov. He, therefore, in the name of the protecting Powers demanded the abdication of King Constantine and the nomination of his successor, who was not to be the Crown Prince.

Abdication of King Constantine of Greece.—A Crown Council was summoned and King Constantine signed an act of abdication in favour of his second son, Prince Alexander. On the 12th Jonnart received formal notification of the abdication and a royal proclamation was posted in the streets. In the afternoon Fr. troops were disembarked at the Piræus and the ex-king and his family left for an Italian port on the way to Switzerland. The most influential of the pro-Ger. party were exiled, and others were put under police supervision. The abdication was received with complete indifference by the country at large. On the 14th the Allied blockade of Greece came to an end. On the 21st Jonnart concluded an agreement with Zaimis for convening under Venizelos the Chamber which had been elected in 1915 and illegally dissolved. Accordingly, on June 25, Zaimis resigned and Venizelos formed a Cabinet which assumed the task of rebuilding Greece from the political chaos to which it had been reduced. Thus, at last his loyalty to the Allies was rewarded, and he showed the same determination in rehabilitating his country as he had in working for the overthrow of its previous rulers. (xxvi.) INTRIGUE IN WESTERN EUROPE (1917).—*Stockholm Conference.*—As has been seen in considering the Russian Revolution, there was some tendency towards peace moves among the peoples of Western Europe during 1917. The invitations which had been issued to the Stockholm Confer-

ence in April had been vigorously discussed by the Socialists of the western Allied countries. The Fr. Socialist Party began by refusing the invitation, and the British Labour Party adhered to the resolution passed by its Manchester Congress that there could be no relation with Socialists from enemy countries so long as the invaded countries were not evacuated; but when the Soviets pressed for a conference on the formula 'No annexations or indemnities' there was some weakening in the Allied refusals. As the Fr. Gov. refused to grant passports, the Fr. were unable to go in any event; but passports were granted to Labour delegates from Britain whom the Soviets invited to Petrograd on the understanding that the delegates did not go to Stockholm. As the British Seamen's Union refused to carry these delegates they got no further. The preliminary conference in June produced a statement by the Ger. delegation showing that they represented their gov.'s view, for they made all the familiar claims relating to Germany having fought a purely defensive war, and refused to consider Alsace-Lorraine on a special footing. A plenary conference was proposed for August, and four representatives of the Soviets toured Western Europe to prepare the ground. It was soon evident that they had no interest in nationalities and that their sole purpose was to prepare for the international class war. Opinion in the Allied countries on the subject of the conference became still more hopelessly divided, and although Mr. Arthur Henderson on his return from his gov. mission to Russia advocated a consultative conference, the Trades Union Congress finally repudiated the idea of any conference at that time. But in August the Pope issued an appeal to the belligerent states to consider concrete proposals for peace, in which the Allies noted certain impossible suggestions for the restoration of the *status quo ante bellum* which would have been all in Germany's favour. Berlin welcomed negotiations on the lines suggested; but President Wilson on behalf of the Allies issued a reply setting forth their view that such terms would involve unending future conflict and the establishment of an armed confederacy to ensure that Germany observed the terms. This further suggestion of peace talks encouraged the underground activities of certain elements, particularly in France, where M. Caillaux (*q.v.*) was reputed to be the chief power behind the scenes in the ranks of those who were subordinating the national

to other interests. Among them were also M. Malvy (*q.v.*), under whose régime as Minister of the Interior internal conditions in France had suffered severely; and among more obscure people who were definitely enemy agents was the notorious Bolo (*q.v.*).

Clemenceau becomes Premier of France.—Successive Fr. Ministers had been so complacent towards these persons that it was not until Clemenceau became Premier in Nov. that their activities were checked. Georges Clemenceau (*q.v.*), at this time seventy-six, had played a great part in public affairs since his youth, but in his old age he was to play the greatest part of his life in stimulating France to a great final effort for victory. Promptly on his accession to power he arrested and tried Bolo and the smaller conspirators, exiled Malvy and finally in Jan. 1918 had Caillaux arrested and brought to trial before a court-martial on the charge of endangering the safety of the state. The charges against Caillaux were, however, never proved and his return to power in later years would seem to show that his reputation had not suffered.

(xxvii.) ITALIAN FRONT (1917).—*Cadorna's Appeal for Allies' Assistance.*—On the Italian front it will be remembered that the Italian advance into the Carso with the ultimate objective of Trieste, on which the Italians had unwisely set their hearts, had been held up by the great fortified hill of Mount Hermada. In May 1917 Cadorna made a great effort to outflank the other great obstacle to his eastward advance, the Selva di Ternova, by seizing the Bainsizza plateau and the valley of Chiapovano; but this difficult advance failed, and he then turned his attention once more to Hermada, where the Italians gained a footing on May 23, only to be driven off again by an Austrian counter-attack on June 5. It became clear that Italy could not succeed by her own unaided efforts, and in July Cadorna appealed to Britain and France for help. Britain sent some batteries of artillery, but neither could spare infantry. Hence in August Cadorna resumed his attack alone. It was dictated by political needs, for there was serious discontent in Italy, which was looking for a victory to destroy the adverse impression made on the Italian mind by the Pope's Note of August with its references to 'useless slaughter.' In spite of certain initial successes, the Italians were again driven back by Austrian troops recalled from Russia, and by the end of Sept. Cadorna announced

that his main operations were at an end. The Italian losses had been tremendous, with no gains worth mentioning. If they had failed against the Austrians alone, they were unlikely to succeed against a Ger.-Austrian combination which was now almost ready to deal a decisive blow. Ludendorff had for some time been preparing to apply Ger. methods to the Italian front, and in Aug. he transferred von Below from the Western Front to the Italian and gave him the command of six Ger. and seven Austrian divisions. The control of the campaign was taken over by the Ger. High Command, and since they required a speedy success on the Italian front in view of the approaching threat from American participation, they varied their customary strategy. The new plan was to dispense with the devastating preliminary bombardment, and to rely on picked troops to break through the enemy lines, and to follow up the first of such troops with wave after wave of fresh troops. The part of the line to be selected for this new method was determined by the information the Gers. had received as to the breakdown of *moral* among the Italian troops during the summer. At Turin there had been riots in which the soldiers had fraternised with the rioters, and Bolshevik agents had been active in that area from which the disaffected troops had been sent as a punishment to the Isonzo front in the neighbourhood of Caporetto.

Italian Defeat at Caporetto.—It was on this front that von Below intended to attack. The attack began on Oct. 24, in heavy rain and snow which helped the Gers. by increasing the element of surprise. The 2nd Army, which comprised the disaffected troops, broke immediately, so that by the morning of the 25th the Gers. had crossed the Isonzo, taken Monte Matajur, which was 5000 ft. high, and were across the Italian frontier. They had nullified in a day all the Italian gains of the previous two and a half years. Elsewhere the Italian troops fought with great gallantry, but they could not counteract the effect of the complete collapse in the centre, and the 3rd Army in the Carso was in grave peril of being cut off from its line of retreat. There was no alternative but to retreat along the whole line, and by the 29th not only Gorizia but Udine, 12 m. inside the Italian frontier, had fallen, and von Below had taken 100,000 prisoners and 700 guns. The 3rd Army, owing to the soundness of the Duke of Aosta's leadership and its high discipline, escaped with the sacri-

fice of 500 guns at the crossing of the Tagliamento at Latisana on Nov. 1. Heavy rainfall followed which turned the riv. into a torrent so that the Gers. could not cross; but the position could be turned from the N., and the Italian retreat accordingly continued across the Livenza and the Piave, where Cadorna made a stand on Nov. 10. It was essential to hold the line of the Piave, since on it depended the security of Venice, Italy's solitary naval base in the northern Adriatic. There was a grave risk that this line also might be turned by an Austrian advance down the Brenta valley; but the Gers. had not been prepared for the extent of their success, and von Below's troops were not intended for permanent service on the Italian front. The Austrians continued to attempt to turn the flank of the Italian position; but they received little help from the Ger. troops, which were withdrawn as soon as their immediate object had been attained of securing large quantities of booty and of forcing the western Allies to divert troops to the help of the Italians.

British Expedition to Italy.—The British sent a corps under Plumer and the Fr. sent one under Fayolle, and the disaster of Caporetto (*q.v.*) had at least the effect of steeling the resolution of the Italian people. The Austrians, however, captured the heights above the Venetian plain, until in the middle of December they reached the limit of their invasion, from which time the Italians with the Fr. and British contingents began to drive them back. The fighting continued well into 1918 without much change in the position. Nevertheless it had been a brilliant military success for the Central Powers. At slight cost to themselves they had penetrated far into Italian territory, had taken a quarter of a million prisoners, 1800 guns, and vast quantities of munitions and stores.

(xxviii.) FORMATION OF ALLIED COUNCIL AT VERSAILLES.—But at least for the Allies Caporetto had one salutary effect in that it convinced the politicians of the necessity of unity in the Allied High Command. At a conference at Rapallo on Nov. 5, attended by Mr. Lloyd George, with General Smuts, Sir William Robertson, and Sir Henry Wilson, on behalf of Britain, by M. Painlevé and General Foch for France, and by Signor Orlando, Baron Sonnino and Signor Alfieri for Italy, it was decided that an Allied Council should sit at Versailles. Cadorna was sent as Italian representative to Versailles, while his place as Commander-in-Chief was taken by General Diaz (*q.v.*),

who had been very successful in the Carso battles. (*See also CADORNA, MARSHAL.*) At the end of this critical year the strong men on the Allied side were Lloyd George, Clemenceau, Orlando, and Wilson. It has been seen how Clemenceau defeated intrigue in France; but still more important was the support he now gave to the newly-emphasised war aims of the Allies, to their determination to secure a lasting peace by the eventual establishment of a League of Nations. But at this point the influence of President Wilson was greatest among the Allied leaders, and on Jan. 8, 1918, he issued a statement of America's war aims embodied in fourteen points. These famous Fourteen Points (*q.v.*) included many important statements of the rights of minorities, open diplomacy, and guarantees for the reduction of armaments; but the point that held out most hope for the future was the fourteenth: 'A general association of nations must be formed under specific covenants for the purpose of affording mutual guarantees of political independence and territorial integrity to great and small states alike.'

(xxix). **BRITISH WAR ORGANISATION IN 1918.**—*Allied Naval Council.*—The opening of 1918 found Great Britain shouldering the heaviest burdens she had been called upon to bear during the War. During 1917 the army had been increased by 820,645 men, and some 700,000 men and 800,000 women had been incorporated in civilian organisations for war-work. A million additional acres of land had been ploughed, British shipping replacements had reached 624,000 tons during the year, the number of guns available for France had increased by 30 per cent., and the supply of aeroplanes was two and a half times as great as in the preceding year. The Ministry of Food had succeeded in regulating the supply of essential foodstuffs, so that during the winter there was no real want. All these positive achievements involved severe strain on the pop., and Mr. Lloyd George's new gov., in spite of the creditable improvements in organisation secured since its accession to power, incurred a good deal of criticism, partly because it had not fulfilled the extravagant claims made for it on assuming office. Naval methods were severely criticised after the destruction in Oct. 1917 of a convoy of twelve British ships bound for Norway under the escort of two destroyers. In December an Allied Naval Council was set up in Paris to co-ordinate naval policy, and by February 1918 the submarine menace seemed to have been largely

overcome. Air-raids entered upon a new phase in 1917, when the Zeppelins were largely displaced by aeroplanes which raided various Eng. towns during the summer in daylight, and after the defences had been improved, on moonlight nights during the autumn and winter. They inflicted a considerable number of casualties and to some extent achieved their purpose of demoralising the civilian pop.; but public confidence in the development of defensive measures never waned, and the policy of reprisals adopted by the gov. in the autumn of 1917 was condemned even by many who had experienced the effect of the raids. Though there was no lessening of the determination of the British people to carry the War to a successful conclusion, there was considerable bitterness over the prodigal wastage of British troops in the unsuccessful operations on the Western Front during the autumn.

(xxx). **GERMAN PREPARATIONS FOR SUPREME EFFORT.**—*British Western Front Weakened.*—There is ground for believing that Mr. Lloyd George's gov. did not fully appreciate the position on the Western Front, where Germany was preparing a great spring offensive. British observers had as early as Nov. drawn attention to the probability of this offensive, and had deduced the intention of the Gers. from their successful weakening, by the Italian campaign, of the British and Fr. strength on the Western Front; but no serious steps were taken to strengthen the British front in time for the spring offensive. In December the Prime Minister had announced that the Russian Revolution and Italian defeat imposed new obligations on Great Britain, but his legislative proposals for increasing British man-power were postponed until a later session, and when they were introduced were inadequate. Meanwhile the British front, where the Ger. attack was likely to come, was being further weakened by extension from St. Quentin to Barisis in order to shorten and therefore strengthen the Fr. front, which latter was not the Ger. objective. The Allied military council which had been established at Versailles after the Italian disaster did not function efficiently, as the first representatives held important commands and were therefore frequently absent from the council meetings, and when their place was taken by others of lower military prestige, these were unable to give effect to their suggestions. Matters did not improve in the early months of 1918. In January Sir Henry Wilson, then British military representative at Versailles, reported that,

in his opinion, the Ger. attack would be directed against the British front between St. Quentin and Cambrai. His Fr. colleagues refused to accept his opinion, and his own gov. did not act upon it. On Feb. 16, it was announced that Sir William Robertson had resigned, because he could not approve of the new powers to be given to Versailles. Meanwhile American participation was being delayed by an exceptionally severe winter and by the difficulty of converting a vast peaceful country into an efficient war-machine; but in spite of these adverse factors the British Cabinet continued to keep over 300,000 troops in Britain, possibly because of scares of a Ger. invasion of England revived by strategists who ignored the elementary truth that a maritime invasion cannot be successfully carried out without first securing command of the sea. Meanwhile, owing to the military collapse in Russia, the Gers. were able to transport troops from the Eastern to the Western Front to countervail the slight numerical superiority the Allies had now secured on that front, and it is probable that they had a margin of about a quarter of a million men in reserve. On the Allied side there was no chance of any immediate increase. Several months must elapse before the Americans could put any appreciable number into the field, and France had reached the limit of her resources. The Allied High Command, disregarding all warnings, seems to have believed that it had only to carry on a defensive campaign against moderate odds during the spring while it awaited the decisive entry of the Americans. But the plans of the Gers. were on very different lines.

German Military Plan and the Reichstag.—Sometime in Feb., Ludendorff and Hindenburg met the Reichstag in secret session and explained their plan. They promised complete victory in the field before the autumn. The submarine campaign had not done all that was expected of it, and it was now clear that American troops could not be altogether prevented by it from landing in Europe; but during the next six months the Allies would still have to carry on the War alone, and now was accordingly the time to strike the decisive blow. It was admitted that the great Ger. offensive must necessarily be costly, the Ger. losses being estimated at a million and a half. The Reichstag approved these plans, and a new wave of confidence spread through Germany, while Ger. representatives everywhere adopted a note of renewed assurance. The Ger. plan was to be achieved through the isolation of the British

army, effected by separating it from the Fr. on its right and confining it between the Somme and the Channel. This accomplished, the British army could be held with a few troops and the main attack could then be directed against the Fr., who would collapse under the weight of the attack of the whole Ger. force. The first objective, therefore, must be the junction between the Fr. and British, which the Gers. assumed would be weak. Owing to the intricate railway system which the Gers. commanded behind their lines they could concentrate troops rapidly at any point in their rear, and, with the advantage of the interior position in the huge salient which constituted the Western Front, they could then send these troops along their railways to any point on the front selected for the attack long before the Allies could take adequate steps to meet the threat. The essence of the Ger. plan, as of the original Ger. plan at the opening of the War, was speed. The troops were massed into armies of special storm-troops, with very few left in support; so that the whole plan depended on the success of the first attacks, for the elaborate tactics involved took no account of secondary troops. It was evident that the expected Ger. victory was also to be used to restore the shaken reputation of the Ger. Imperial family; for, at the opening of the attack, it was announced that the Emperor was in command, and von Hutier's army (disposed opposite the British lines in the Oise sector), which was intended to be the spear-head of the thrust, was included in the army group of the Imperial Crown Prince.

(xxx.) GERMAN OFFENSIVE OF SPRING, 1918.—*Attack on British 5th Army.*—The offensive began at dawn on Thursday, March 21, precisely against that sector of the British front indicated by Sir Henry Wilson two months before, and, it would seem, also by General Gough. This part of the British line was held by General Gough's 5th Army, with fourteen divisions against approximately forty Ger. divisions. The Ger. offensive was helped by abnormally dry weather which reduced the strength of the water defences on the right of the British line, while a dense fog favoured the attack on the British forward positions. Ger. infantry crossed the Oise canal of La Fère unobserved, and many British outposts were surrounded before it was realised that the attack had begun. Gough's 5th Army suffered severely in the first day's attack and by the end of the day the Gers. were in his battle-zone at both

extremes of his section of the line, W. of La Fère and N. of St. Quentin. Byng with the 3rd Army further N. had also been compelled to abandon many villages, and the Gers. had reached St. Leger in their effort to thrust a wedge between Arras and Cambrai. On the two following days the Gers. made vigorous attacks along the line of the Somme, and the Péronne bridge-head was abandoned. On the 24th the 3rd Army surrendered Bapaume and nearly all the gains of the Somme campaign of 1916, while on the 25th they were driven back to their old positions on the Ancre, thus exposing the flank of Gough's army, whose right and centre had also been driven further back. On the 26th, the Gers. broke through the old British line Beaumont-Hamel and Hébuterne and reached positions they had not occupied since 1914; but here they were finally held. Gough, however, had to give still more ground, and gaps appeared between his line and Byng's on his left, and between his line and the Fr. on his right. On the 27th it appeared likely that the Gers. would destroy the liaison between the different armies, but the great vigour of the attack had exhausted the attacking armies, their communications now lay across the devastated area, and rain was hampering their movements. When von Below's comparatively fresh army (originally disposed opposite the British from Arras southward) resumed the attack on the 28th they could not penetrate the battle-zone at any point.

Failure of German Offensive N. of the Somme.—This was the decisive failure of the Ger. offensive and, N. of the Somme, the British front was now secure; but S. of the riv. the Gers. continued to make some progress. During the next few days the situation continued to be grave for the Allies; but the retreat had now merged into a battle in which they had some successes. A hastily organised 4th Army reinforced Gough's 5th Army, which had, however, recovered its equilibrium under extraordinary difficulties; while, at this time, the important decision to appoint Foch as Commander-in-Chief of the Allied armies on the Western Front was taken at a conference on the 25th between Haig, Pétain, Milner and Clemenceau. On April 4, von Hutier tried to reach Amiens and drove back the Allies some distance further, but did not reach the city.

Political Controversy in England over Extension of British Line.—In his speech to parliament on April 9, Mr. Lloyd George averred that the respon-

sibility lay partly with M. Clemenceau as the author of the extension of the British line, and partly with General Gough. Since the latter could at the time make no answer, the *ex parte* character of the attack provoked a reply in a letter to the Press from Major-General Maurice, lately Director of Military Operations, pub. on May 7th, which challenged the accuracy of ministerial statements. His charges were so serious that the gov. proposed a judicial inquiry. Mr. Asquith moved instead for a parliamentary committee, and the gov., by treating his motion as a vote of censure, escaped all investigation.

General Gough and the Fifth Army.

—General Gough, a most distinguished soldier, would appear to have been a scapegoat for the 'Yellow Press.' It is to be noted that in his book *The Fifth Army* (1930) he throws much light on the situation. On Feb. 1, 1918, having observed the preparations of von Hutier against his sector, he wrote to General Headquarters an argued statement pointing out the dangerous position of his army, and the inadequacy of its strength—eight divisions on a 40-m. front. Six more divisions were eventually sent to him, but according to Gough, his rôle was clearly understood to be to retire gradually and to delay and exhaust the enemy without exposing the 5th Army to annihilation. He foretold the exact date of the bombardment and of the infantry attack. On that date, twelve weak British divisions, cut to nine infantry battalions, strove to check the onslaught of forty-two Ger. divisions. As the battle proceeded, the 5th Army was ordered to hold on to the line of the Somme, which it did for two days, but this only led to further danger, for the few Fr. on the right retired southward, taking some of the 5th Army with them, while the Territorial Army units on Gough's left withdrew too soon and too fast, thereby leaving a gap on that side. Foch, apprised of the position, demanded that there should be no further retreat, and the attempt to carry out this order nearly involved the destruction of a whole corps. On March 26, Gough told G.H.Q. that given two more divisions, he could push back the weakening enemy in front of his army. The Fr. now appeared in force and on the 28th the situation became stationary, but on that day Gough was superseded by General Rawlinson. Gough surmises that the true situation of the 5th Army was misunderstood by Foch. He was promised a Court of Inquiry, but no inquiry was held.

Results of the German Offensive.—The great Ger. attack had failed in its object of breaking the Allied line; but it had achieved much more than any Allied offensive during the whole War. By April 4, the Gers. claimed 90,000 prisoners and 1300 guns, and the British 5th Army had been partly destroyed. (See FRANCE AND FLANDERS, CAMPAIGNS IN (GREAT WAR).) This great offensive did not exhaust the Ger. effort, which was resumed on April 9; but the offensives that followed were not on the scale of the first and showed signs of indecision in the Ger. High Command. Ludendorff now had to choose between the dangerous admission that the chief object of the offensive had failed and the attempt to palliate the true military situation (which was rapidly growing hopeless in view of the enormous numbers of American troops sailing to Europe) by a fresh onslaught. Anticipating an attack in Flanders, Haig had arranged to relieve the two Portuguese divisions which had been holding the front from the Lys to La Bassée, but he could only replace them by tired British divisions and the change had only been half effected when Ludendorff launched the attack of April 9 (Battle of the Lys). The Portuguese broke quickly, the British flanks on either side were turned, and the whole centre had been lost in a few hours.

Battle of the Lys.—Between the 9th and the 12th a considerable advance had been secured by the Gers.; but they had lengthened instead of shortened their line and were left in a salient. The necessity of obtaining some commanding positions compelled the Gers. to convert this movement from a subsidiary to a major operation and they continued to hammer away at this sector until the end of the month. Local fighting continued until late in May, but it was clear that Ludendorff's second offensive had met the same fate as his first. The Gers. had fought their last offensive against the British front, and when, after a month's pause, they resumed their attacks they were directed against the Fr. Meanwhile, in Great Britain, a new Military Service Bill was passed to extend the liability to military service to all men under fifty-one and to bring Ireland within its scope. It was an unwise move, for the raising of the military age tended rather to weaken British industrial power than to increase military power, and the extension to Ireland did but inflame that country and deliver it over to Sinn Féin, thereby necessitating the diversion to Ireland of large numbers of British troops to engage in a bitter

civil war, without producing a single Irish conscript. A wiser but too belated move was the prompt dispatch to France of 300,000 superfluous troops which had been kept in England all through the Ger. offensive ostensibly through fear of invasion.

(xxxii.) AMERICAN ARMIES IN FRANCE.—*British Losses.*—It was, however, the amazing rapidity with which at length the American troops were sent to France that saved the British Gov. from the effects of its own blunders. In April nearly 120,000 American troops landed in Europe, over 220,000 in May, and 275,000 in June. On July 2, President Wilson announced that over a million had sailed, and in July General Smuts was anticipating the possible presence in France of an American army as large as the British and Fr. combined. The need for so immense a force did not arise, but in April the military situation exposed the British Gov. to the kind of criticism it had itself directed against its predecessors in office. Apart from casualties the British had lost 1000 field guns, 4000 machine guns, 200,000 rifles, 70,000 tons of ammunition and 250 million rounds of small ammunition, and 200 tanks.

Allied Premiers' Appeal to America.—As quickly as troops could be organised, in the early part of 1918 American soldiers were sent into line with the Allies, because of the effect this would have in breaking the moral of the Ger. troops and people, who had been assured that the submarines would keep the U.S.A. from entering effectively into the war. On Jan. 19, 1918, the American First Division took over a sector N. of Toul; the 26th went to Soissons early in Feb., and the 42nd near Lunéville. The Second Division was stationed near Verdun, March 18. Meanwhile a skeleton of the future American army was being built up with headquarters at Neufchâteau. The terrible attack of the Gers. on Gough's 5th British Army alarmed the Allies and the U.S.A. Mr. Lloyd George sent an urgent request that Lord Reading, the British Ambassador to the U.S.A., should ask President Wilson to accelerate the sending of American troops, the Allies undertaking to provide for the manufacture of the necessary artillery, aeroplanes and machine guns, inasmuch as the American programme of manufacture was still in its early stages. President Wilson promised to do his utmost. All available American and British ships were used for transport services, were escorted across the Atlantic by

American destroyers, and when they neared Europe were assisted by the British navy. The Americans and British between them transported safely through mine-fields and submarines some 2,000,000 American troops to France; and 2,000,000 more were being made ready. But though these reinforcements were in excess of what at one time seemed practicable, the crisis still continued. General Foch had presented to the Allied Prime Ministers a statement of the utmost gravity, pointing out the numerical superiority of the Gers. in France, where 162 Allied divisions were opposed to 200 Ger. divisions, there being no possibility of the British and French increasing the number of their divisions. Foch therefore urged that the greatest possible number of infantry and machine gunners, in which respect the shortage of men on the side of the Allies was most marked, should continue to be transported from America in the months of June and July to avert the immediate danger of an Allied defeat in the summer campaign owing to the Allies' reserves being exhausted before those of the enemy. He placed the total American forces required at no fewer than 100 divisions and that there should not be less than 300,000 fresh American levies per month. The troops were forthcoming, and during the summer 300,000 men a month crossed the Atlantic.

(xxxiii.) GERMAN ATTACK ON THE CHEMIN-DES-DAMES.—*German Armies reach the Marne.*—Meanwhile popular opinion in France had attributed Ger. success at St. Quentin and in Flanders to British incompetence, and on the eve of Ludendorff's next offensive a Fr. journal proclaimed that it would be another blow against the British, because the Gers. knew that the Fr. line was impregnable. The attack on the Chemin-des-Dames when it came on May 7 was to alter this opinion. The Chemin-des-Dames would have been impregnable if properly held; but Ludendorff's information told him that success was possible, and he was able to achieve the most rapid advance of the War on the Western Front. The line from Soissons to Rheims was held by only eight divisions, four Fr. and four British, one of these in reserve, and in a few hours the Fr. had lost all their gains since October 1914 and were back again beyond the Aisne. The British divisions, which had only been sent there for rest after their hard work in March and April, offered a stout resistance and maintained themselves in their second positions all day;

but the Fr. retreat had uncovered the British left flank and in the evening they had to retire to the Aisne. By that time the Fr. had been driven back from the Aisne nearly to the Vesle, and on the 28th they were driven well S. of the latter riv. On the 29th the Gers. broadened their front by taking Soissons, and on the 30th the apex of the salient they had made had reached the Marne between Château-Thierry and Dormans. For three days they had advanced at the rate of 10 m. a day, capturing some 40,000 prisoners and 400 guns. From that time, however, the pace slackened, although the Gers. continued to drive the Fr. back on the W. of the salient along the Savieres R. American troops drove the Gers. back S.W. of Château-Thierry on June 4-5, and British troops recaptured Bligny, S.W. of Rheims. The next Ger. attack, on June 9, between Montdidier and Noyon, was a failure.

(xxxiv.) BRITISH NAVAL RAIDS ON ZEEBRUGGE AND OSTEND.—The purpose of the British naval raids which took place on April 23, on Zeebrugge and Ostend, was to block the submarine and destroyer exits from those ports, both of which were connected by canals with Bruges. At Ostend it was intended simply to sink ships in the fairway; but at Zeebrugge there were also to be diversions by way of a landing on the protecting mole and the blowing up of the viaduct which connected the mole with the shore. Success was possible only if mist and smoke-clouds aided the concealment given by night, and conditions seemed favourable on the night of April 22-23; but a quarter of an hour before the old cruiser *Vindictive* reached the mole a breeze dispersed the smoke-clouds and it was under a torrent of shell-fire that the party landed on the mole and destroyed its works, while a submarine loaded with explosives was run under the viaduct and exploded. Meanwhile the block ships were sunk and the survivors of their crews were rescued by the *Vindictive* and her consorts. At Ostend the block ships were sunk outside the centre of the fairway; but on the night of May 9-10 the effort was repeated with better success by the *Vindictive*. These raids hampered the Ger. submarine campaign to some extent and destroyed the residue of Ger. sea-power; results which were proved by the safe transport of hundreds of thousands of American troops across the Atlantic.

(xxxv.) THE ITALIAN FRONT.—*Austrian Advance.*—With the check they had suffered in their offensive on the Western Front the Gers. could

only hope for success in the Austrian offensive launched against the Italians on the Piave on June 15. No Ger. troops could be spared for this offensive, and moreover, the Italians had laboured strenuously to strengthen their defences while the front had been quiescent during the spring. The Austrians were in no condition to conduct a successful offensive, for the Austrian domestic situation was deplorable, parliamentary gov. had been suspended, and nearly half the pop. of the Empire was in revolt. Hundreds of thousands of Czechoslovaks and Yugoslavs had joined the Allies and some were helping the Italians on the Piave front. But it was hoped that Ger. tactics might supply the place of Ger. troops. There were two battles, one in the mountains, whose object was to turn the whole Italian front on the Piave, and the other a frontal attack across that riv. between the Montello, the pivot of the mountain, and riv. fronts and the sea. The mountain attack was the more promising, but achieved less success. That front was partly held by Fr. and British troops, and an insignificant advance which the Austrians made on the 15th was stopped on the following day. The attack on the Piave was at first more successful; a good deal of the Montello was captured, a serious impression was made on the Italian right wing at San Dona di Piave, and fourteen new bridges and nearly 100,000 Austrian troops were thrown across the riv. But fortune favoured the Italians, for torrents of rain flooded the riv. and broke ten of the Austrian bridges.

Italian Counter-attack on the Piave.—On the 18th the counter-attack began, and by a brilliant combined movement by soldiers and sailors the Austrian left was turned on the 21st. On the 22nd a general retreat across the riv. was ordered. It was skilfully conducted, and the Austrians escaped with slight losses, considering the precarious position into which they had fallen. Their offensive had been a complete failure, but General Diaz did not think it prudent to follow up his success by an advance across the riv.

(xxxvi.) **MARSHAL FOCH'S COUNTER-OFFENSIVE.**—*Ger. Retreat Begins.*—Meanwhile, the Ger. people were encouraged by contemptuous references in the Ger. Press to 'Foch's reserves' as being non-existent, and by statements that American armies which could not swim or fly the Atlantic would be prevented by Ger. submarines from reaching Europe. The Ger. High Command had, of course, no such illusions; but

Ludendorff had no choice but to proceed with his offensive, which had now become a desperate gamble. His efforts since the end of May had been without result, and he had used up most of the divisions he had probably intended to employ in a final attack on the junction of the Fr. and British armies. His next attack in the Rheims neighbourhood showed that he was reaching the end of his resources, for he could hope for no decisive success in that area. The attack began on July 15 with the object of encircling the Montagne de Rheims, the chief bastion of the line of communications between Paris and the eastern front on the Meuse. Simultaneous attacks were made to the E. and to the S.W. of Rheims. The first was unsuccessful; but on the S.W. the Gers. advanced some 3 m. across the Marne. But this was the limit of the advance, which was soon transformed into a retreat. By the evening of the 17th the Allied forces were successfully counter-attacking all along the line, and at dawn on the 18th Foch delivered the blow which was the turning point of the whole War and began his triumphant progress towards the ultimate victory of four months later. Few observers realised that the tide of fortune had turned definitely in favour of the Allies at the end of July; but Foch's counter-offensive was merely the culminating point of a complicated series of events which made further Ger. success impossible, and the decisive factor was the arrival of the American troops which allowed Foch to plan his movements on a great scale, without fear of weakening one part of his front by a successful operation on another part. Concealed by the forests of Compiègne and Villers-Cotterets, Foch had assembled reserves in considerable numbers. From the Aisne southwards to the Ourcq, Mangin commanded an army containing the pick of the Fr. colonial troops, and thence to the Marne was Degoutte's army which included five American divisions. Before them ran the Ger. flank weakly guarding the line of communications with the Ger. front on the Marne. Led by a vast fleet of Fr. 'mosquito' tanks, similar to the small British tanks known as 'whippets,' which had been introduced that year, the Fr. early on the 18th broke through the Ger. defences on a front of 27 m. and advanced from 2 to 5 m. towards the Soissons-Château-Thierry road. By the 20th the Gers. had regained the N. bank of the Marne, but without serious loss. On the 21st they abandoned Château-Thierry, and on August 2 the Fr. were in Soissons. By the 3rd the

Gers. had been driven across the Vesle and the salient had been flattened out. Elsewhere there were signs that the Gers. were breaking. On July 4, Australians and Americans together had captured Hamel. On the 19th the British had recaptured Meteren at the apex of the Ger. salient across the Lys, and Merris fell on the 30th. On Aug. 4, the Gers. withdrew from all their ground across the R. Avre. But the first great success was Rawlinson's advance with the 4th Army on the Avre and along the road from Amiens to St. Quentin on which the Gers. had made their westward drive in March. On the first day the Gers. were driven back 7 m. Thenceforward the advance continued steadily all along the line. (The details will be found under FRANCE AND FLANDERS, GREAT WAR, CAMPAIGNS IN, and here can be noted only some of the more important dates.) By Aug. 15, the Allies had captured 33,000 prisoners and over 600 guns. The next great blow was struck by Byng's 3rd Army N. of the Somme between Albert and Arras on the 21st. The Ger. centre at Thiepval was outflanked on both sides and gave way on the 24th, while Byng pushed forward to Bapaume, which fell on the 29th, as also did Noyon, which had been outflanked to the S. by Mangin's advance between the Oise and the Aisne. On the 31st the Australians stormed Mont St. Quentin, the bulwark of Péronne, and captured Péronne itself on September 1. Simultaneously Byng pressed forward from Bapaume to the Canal du Nord. But behind this land the Gers. still had the Hindenburg Line, and it was not until Horne's 1st Army on September 2 broke the Drocourt-Quéant line on a front of 6 m. that apprehension became general in Germany. Actually the waterways behind this section of the Hindenburg Line proved greater obstacles to a further advance than were experienced at other parts of the line, and the British troops were held up here for some weeks, while on the rest of the line great advances were continuing. Bailleul fell on Aug. 30, Mount Kemmel on the 31st, Ploegstreet Wood on Sept. 4, and on the 6th the Fr. took Ham and Chaunty.

American Attack on St. Mihiel Salient.—With American troops now pouring in, Allied superiority in numbers was merely a question of time; for even with their troops drawn from the Russian front the Gers. could not replace their losses. Foch now allowed Pershing, who was forming an independent American army, to undertake the

first great operation upon which he had been so insistent, namely to attack the St. Mihiel salient, which had been held by the Gers. since 1914. The reduction of this salient would prevent the Gers. from placing the Paris-Nancy railway under their artillery fire and would also free the railway leading from St. Mihiel to Verdun. The salient was in difficult wooded terrain with the enemy holding the heights of the Meuse. The Allies sent an ample force of heavy artillery. There was also the largest force of aviators ever engaged in one operation. It was composed of all the American aviators, a French force, and some of the best British bombing squadrons. Major-General Liggett had command of the First Corps and Major-General Dickman of the Fourth Corps. At dawn on Sept. 12, after four hours of violent artillery fire, the attack was launched by 430,000 American and 70,000 French troops and was successful; 16,000 Ger. prisoners were taken, as well as 143 guns and a large quantity of material and supplies. On the 15th both Austria and Germany made overtures for peace, but President Wilson at once returned an unsympathetic reply.

British Advance through Flanders.—Meanwhile the British were pushing forward in Flanders. On Sept. 27 the 1st and 3rd Armies forced the Canal du Nord, and by the 30th the British menace forced the Gers. to surrender St. Quentin to the Fr. On the same day British and Colonial troops took points both N. and S. of Cambrai. Of the four operations concerted by Foch with Haig, those of the American and British had been successful, and the Belgian attack from Ypres on Sept. 28 equally so, with the capture of Dixmude on the 29th; while the third resulted in the gradual driving back of the Gers. in the combined Belgian and British attacks from Armentières, La Bassée, and the whole of the remainder of the Drocourt-Quéant line. The Fr. and Americans had greater difficulty in the Argonne and on the Meuse, the latter being for some time delayed by a breakdown in their organisation; but progress all along the Fr. front continued during Oct., and on the 11th the Fr. took the Chemin-des-Dames and on the 13th La Fère and Laon. The check to the Americans enabled the Gers. to transfer reinforcements to Cambrai and Valenciennes, so that Cambrai did not fall until the night of Oct. 8. On the 10th Le Cateau fell.

Closing Battles of Western Front.—In the middle of Oct., Belgians and Fr. under Degoutte and the British 2nd Army under Plumer attacked the whole Flanders front, and by the 17th

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Ostend had been abandoned, on the 19th Zeebrugge and Bruges, and by the 21st the Gers. had been driven back 20 m. from the sea and were trying to make a stand on the Lys Canal in front of Ghent. To the S., also, the withdrawal was equally complete. Lille and Douai were entered on the 17th, and by the 21st the British 2nd and 5th Armies had advanced to the Scheldt on a front of 20 m. From the 17th to the 25th fighting continued along the line of the Selle, and these battles yielded 21,000 prisoners. On the 26th Ludendorff resigned. The Gers. could not withdraw safely to their own frontiers on account of the length of their front and the threat the Allies were now making to their communications. Germany's other allies had collapsed one by one, and she was left alone to meet the decisive battles of early November. The decisive actions took place on the right and left of the Allied line, and were carried out respectively by the Americans and the British. Towards the end of Oct. the Americans had resolved their commissariat difficulties, and were beginning to break down the Ger. resistance on both sides of the Meuse. On Nov. 1 the Ger. line was broken, and during the next few days the Americans rapidly followed up their advantage, until, on the 7th, they reached Sedan. Pershing's great attack on the Meuse-Argonne Front began on Sept. 26 and lasted almost continuously until the very eve of the Armistice, when the Americans had all the Argonne in their hands. Their losses in this the greatest battle ever fought by their country's troops were 117,000 killed and wounded out of 1,000,000 engaged; while they captured 26,000 prisoners, 847 cannon and 3000 machine-guns. (For details see under ARGONNE.) Meanwhile the Fr. centre was also advancing and on the morning of Nov. 11 the Allies were converging on Namur. This rapid pursuit of the Ger. centre had been made possible by the final blow given to the Gers. by the British forces in the Battle of the Sambre in co-operation with Debeney's army southwards. A great victory was won which definitely broke the Ger. resistance. By the 9th Maubeuge itself had fallen; Tournai was occupied on the same day, and early on the 11th the Canadians captured Mons. At 11.0 a.m. on that day fighting ceased all along the Western Front, according to the terms of the Armistice which had been arranged (considered in the next section), and the British army thus ended its campaign on the Western Front where it had begun it four years previously.

(xxxvii.) THE ALLIES' TRIUMPH.—*President Wilson's Terms to Germany.*—It is necessary to return to the political events in Germany during the last few months of the War, but reference may first be made here to war-time starvation in the Central Empires. However difficult the Ger. submarine blockade may have made the problem of feeding the Allied peoples, the pressure of the Allies' blockade of the Central Empires was so serious that at times there was serious risk of famine. As early as the spring of 1916 economic conditions within those empires were causing grave anxiety to their govts., and the food situation became so alarming in May of that year that a food dictatorship was set up in Germany with the widest discretionary powers to regulate the supply and consumption of foodstuffs. In the summer of the same year there were riots in Munich and Essen over food difficulties. In these circumstances it is remarkable that the Central Empires avoided famine for three years thereafter, though occasionally fortune smiled upon them, as in 1917-18, when, through the collapse of the Russian front, huge stores of grain found their way to the Central Empires. None, however, can certainly estimate the numbers of human beings who were starved throughout the length and breadth of Europe by blockade, malnutrition and insurrectionary disorders. Towards the end of Sept. 1918 it was obvious that the Ger. offensive in the W. had failed, while Bulgaria and Turkey were on the verge of defeat and Austria was pleading for peace at any price. The Ger. High Command was compelled to urge the civilian authorities to hasten their negotiations, but it was first necessary to set up a gov. in Germany with which the Allies would agree to negotiate, since von Hertling and his associates were compromised by their earlier activities. On Sept. 30, the Emperor accepted the resignation of the Imperial Chancellor and the Foreign Secretary, and announced that it was his wish that 'the Ger. people shall co-operate more effectively than hitherto in deciding the fate of the Fatherland.' At the same time all the other Ministers resigned their posts. The most urgent necessity was to provide an Imperial Chancellor who would represent the new democratic attitude so essential as a façade for negotiation. The Emperor chose Prince Maximilian of Baden, cousin of the Grand Duke of Baden and President of the Upper House of the Baden legislature. Prince Max, as he became generally

known, was a man of considerable personal charm, an aristocrat of liberal views, and had been favourably known to the Allies through his work on behalf of Allied prisoners of war. On Oct. 4, he sent a Note to President Wilson, asking him to undertake the work of restoring peace, and to invite the Allies to send plenipotentiaries to open negotiations. He stated that Germany accepted the President's proposals set forth in the Fourteen Points (*q.v.*) as a basis for peace discussions. He asked for an armistice. On the same day the Austro-Hungarian Gov. sent a similar message to President Wilson. In the Reichstag on Oct. 5 the new Chancellor elaborated his policy. He said that he believed in the League of Nations, he advocated the complete restoration of Belgium, and hoped that an understanding could be reached about an indemnity. He would not permit the Russian treaties to stand in the way of a settlement. President Wilson replied to the Ger. Note on Oct. 8. He first asked whether Germany now accepted the terms he had previously laid down, and then demanded a complete withdrawal of the troops of the Central Powers from invaded territory. Thirdly he asked if Prince Max spoke for the authorities of the Ger. Empire who had so far conducted the War. The Ger. reply delivered on the 12th answered the President's first and third questions in the affirmative, and expressed the willingness of Germany and Austria to evacuate invaded territory if a mixed commission could make the necessary arrangement. Evacuation by agreement was, indeed, the best hope for the salvation of Ger. troops who were rapidly reaching a hopeless position in crowding towards an ever-narrowing base. But once Germany had been able to withdraw her troops in safety there would be nothing to prevent her breaking off the armistice and renewing the War under less unfavourable conditions. Only an armistice involving surrender could secure to the Allies the military advantage they had won with such great effort. Prior to Oct. 14, on which date Wilson replied, events had occurred which were not without their bearing on the Allies' attitude. On the 10th the Irish mail boat had been sunk with the loss of nearly 500 lives. On the 14th was issued the report of a British committee on the harsh treatment by Germany of prisoners taken in the spring of 1918. Furthermore, in their retreat the Ger. armies were burning and looting to render the Allied pursuit as difficult as possible.

Wilson announced that no armistice could be considered while Germany continued these unlawful and inhuman practices. He also asked for some guarantee that the Ger. Gov. was no longer the arbitrary power against which the Allies had been fighting, and emphasised that the conditions of an armistice must be left to the Allies' military advisers, and that no conditions could be accepted which did not absolutely safeguard the Allied military supremacy. On Oct. 20 Germany agreed to these demands, trusting to the President to approve no demand 'irreconcilable with the honour of the Ger. people.' The Ger. Gov. denied the charges of inhuman practices in war but agreed to instruct U-boat commanders to refrain from torpedoing passenger ships. They claimed that the new gov. in Germany was free from all arbitrary influence, and had been completely democratised. In his reply on the 23rd Wilson rejected the claim that the gov. had been truly democratised, since effective power still lay not with the people's representatives but with the Emperor and the Imperial Chancellor appointed by him. 'The gov. of the United States,' he said, 'cannot deal with any but veritable representatives of the Ger. people, who have been assured of a genuine constitutional standing as the real rulers of Germany.' In effect, this was a demand for the abdication of the Emperor and the destruction of the whole system for which he stood. Acceptance of these terms implied complete surrender, and on the 27th Germany accepted them, declaring that peace negotiations would be conducted by a people's gov. The previous day Ludendorff had resigned.

The Armistice with Germany.—At five o'clock in the morning of Nov. 11, 1918, an armistice was signed between Germany and the Allies, and fighting ceased on the Western Front at 11 a.m. on that day. The terms of the Armistice were severe, and included the immediate evacuation of all conquered territory and withdrawal behind the Rhine, leaving the whole left bank and all important bridge-heads open to Allied occupation and a neutral zone on the right bank; the repatriation of all the transported inhabitants and Allied prisoners of war; the quashing of the treaties of Brest-Litovsk and Bucharest, and the withdrawal of all Ger. troops from territories formerly belonging to Russia, Rumania, and Turkey; the surrender of thousands of guns, locomotives, aeroplanes, of all submarines fit for sea, and of the greater

part of the Ger. navy. The surrender had been forced upon Germany by the imminence of military collapse, and the revolution which had been foreseen as a result of a Ger. defeat quickly followed. It was precipitated by an order to the Ger. fleet to fight. The crews mutinied and the revolt spread during the first week of Nov. to Kiel and other ports, and thence throughout Germany. Every Ger. throne was overthrown, and on Nov. 9, the Emperor William abdicated, fleeing with the Crown Prince to Holland. The crowning humiliation was the peaceful transference of the Ger. navy to Scapa Flow on Nov. 21, to be scuttled by its own crews on June 21, 1919.

(xxxviii.) EVENTS IN RUSSIA (1918-1919).—*Bolshevik Relations with Germany.*—Before considering the fate of Germany's allies, we must survey the events in Russia during 1918. After the Treaty of Brest-Litovsk, the Ger. relations with the Bolsheviks varied from equivocal association to open hostility. During April and May Trotsky made abortive efforts to raise a Red Army to drive the Ger. invaders from Russian soil; but with the advance of the Czechoslovak contingent in the S.E., Germany was forced to make an agreement with Lenin, by which she undertook not to advance farther E. than a specified line from the Gulf of Finland to the Black Sea, and the Bolshevik forces were therefore able to give their undivided attention to the Czechoslovaks on the Volga. But in Finland, where Germany had hoped for a new outlet for her influence, Red Guards and White Guards continued to fight, and although a Bolshevik ambassador was sent to Berlin and a Ger. ambassador, Count Mirbach, to Moscow, the Count was assassinated on July 7, and his successor, Helfferich, paid only a hurried visit and departed for Berlin to avoid a similar fate. In the Ukraine Germany committed the blunder of pillaging the country of supplies for her own use, so that everywhere the peasants rose in revolt, and there were many murders and guerrilla warfare, culminating in the assassination on July 30 of Field-Marshal von Eichhorn (q.v.) in the streets of Kiev. The Ukraine had previously been made into a Ger. prov. administered by an ataman, General Skoropadski, who was nominated by Berlin; conscription had been decreed, the peasants forced to return property taken from the landlords the previous autumn and to cultivate their land for the benefit of Germany. The result was this universal rising, which had its effect throughout Russia.

Meanwhile in Russia the attacks of the Czechoslovaks and the Allied intervention (*see infra*) had put the wildest elements in power. On July 16, the ex-Tsar and his family were shot at Ekaterinburg. The fact was only certainly confirmed at a much later date, and by that time the tragedy of the Imperial family was only one of many terrible incidents of the Red Terror in Russia. Red soldiers everywhere were hunting out those suspected of 'counter-revolutionary activity' and murdering them with every circumstance of brutality. The gaols were filled with anti-Bolshevik Russians and with many Allied officials and residents, who suffered every indignity and privation. On Aug. 31, Captain Cromie, British Naval Attaché, was murdered in the British Embassy at Petrograd. From that time onwards terror was unrestrained; priests, officers, officials, merchants, and employers were murdered in scores daily. Several revolutionary leaders, including Lenin himself, were seriously wounded, and every such attempt at retribution was met by the Bolsheviks with enhanced terrorism. On Sept. 6, Lenin signed three further treaties with Germany, giving every kind of security for the satisfaction of the Ger. claims. The Baltic provs. were to have their frontiers defined as Germany pleased. Baku and its oil region was to be made a Ger. preserve, and immediate payment was to be made by Russia to Germany of £50,000,000 in goods and £300,000,000 in gold, and this from a bankrupt country, where all industry was at a standstill.

Allies' Relations with Russia.—From June 1918 onwards the Bolsheviks were recognised as the declared foes of the Allies; but to bring help to the Russian nationalists and to the Czechoslovaks seemed almost impossible, since all ways into Russia were closed except by the Arctic or the Pacific. The Allied decision in favour of intervention was based on the facts that the Bolsheviks were now the declared partisans of Germany and that the Allies were bound in honour to assist the Czechoslovaks and the loyal elements in Russia who were trying to maintain a front against the common enemy. The Allies of necessity wished to avoid the charge that they were interfering in the internal affairs of Russia, but their course was difficult, since there were so many conflicting elements in Russia. The position was further complicated by the fact that some of the Allies were opposed to armed intervention, some because they felt

that it would only strengthen the Bolsheviks, others that it was a blunder to scatter Allied forces which were needed on the Western Front; while the U.S. Gov. held that the only prudent form of intervention was economic and philanthropic. These differences were responsible for the inefficiency and delays of Allied intervention.

British Expedition to North Russia.

—In Feb. and March 1918 the British had effected a landing at Murman, at the head of the Kola inlet, and at Pechenga, the nearest Russian port to the Finnish frontier. There was no serious opposition and soon the arrival of Fr. and American cruisers made the occupation international. The local Soviet worked with the Allies and this landing was in fact approved by Trotsky. Then came the Ger. alliance with Finland who was promised all the territory lying between her eastern borders and the White Sea. To meet this threat Allied reinforcements arrived in June, under General Poole. Presently the Bolsheviks changed their policy and demanded the departure of all Allied forces from Russia. This demand was refused by the Murman provisional gov., which threw in its lot with the Allies. For three months there followed attacks from the Finnish borders which were beaten off by Allied troops assisted by local levies, until Finland finally gave up her desire for conquest and Germany was too fully occupied elsewhere. The isolation of the Murman coast deprived the occupation there of much of its strategic importance, and therefore on Aug. 2 General Poole by a surprise attack occupied Archangel. In Archangel there were immense quantities of war material sent by the Allies to Russia, which the Bolshevik Gov. was now commandeering and selling to the Gers., and the Bolsheviks had imposed their gov. by force on the prov., which was in a starving and desperate condition. The Allies therefore undertook to feed the people, prevent the disposal of the war material to Germany, and establish a free local gov.; they then attempted to push southward to join hands with the right wing of the Czechoslovaks W. of the Ural Mountains. But the Allied troops were far too few for this purpose and completely failed to join the Czechs. Moreover, there was endless trouble with the Russian troops and with the provisional gov. set up by the Allies. By establishing a front across the Dvina R. the Allies had cut off Archangel from its natural source of supply, and they were therefore under the necessity of transporting

food for the pop. over more than a thousand m. by sea to a port which was icebound in winter.

The Czechoslovak Armies in Siberia.

—In Siberia the situation was more hopeful but also more complicated. There were some 120,000 Czechoslovak troops, some at Vladivostok and some on the western borders of Siberia, while between them lay the Trans-Siberian Railway, held in places by Bolsheviks and Austro-Ger. prisoners. There were a number of scattered Russian nationalist troops, some in the Far East, some at points along the line, and a considerable number under Alexeief (q.v.) in the Don and Kuban provs., but separated by a wedge of Bolshevik forces from the westernmost Czechoslovaks. Various govts. were continually emerging throughout Siberia and dissolving as soon as they had been formed, while the Allied policy vacillated as at Archangel, and in the same way the forces finally sent to the E. were too few to be effective. Japan was willing to intervene in Eastern Siberia, but was not interested in the western developments, while America refused to be drawn into the adventure at all except under the most stringent conditions. From first to last the Czechs had to bear the brunt of the contest themselves, and throughout the summer abortive discussions continued among the Allies. On Aug. 3 a British contingent reached Vladivostok to find the Czechoslovaks hard pressed. On Aug. 12 a Japanese contingent followed, while Fr. troops had already arrived, and Americans appeared on the 18th. By Sept. 5, the Czechs with this Allied assistance had cleared the lines of the railway for the whole distance from Vladivostok to the Volga. But the smallness of the numbers of the Allied troops and the continual difficulties with the various local govts. rendered impossible any rapid movement to the help of the Czechoslovaks on the Volga. Help was urgently needed by these troops, for at the beginning of Sept. their ammunition was running low and together with their Russian contingents they numbered only some 60,000 against 100,000 Bolshevik troops supported by the Gers.

(xxxix.) OPERATIONS IN THE CAUCASUS (1917-18).—Meanwhile, in the Caucasus, after the Revolution of March 1917, a general Transcaucasian Gov. had been proclaimed under the influence of the people of Georgia, who were politically the most advanced people of that area. There was anarchy among the Russian troops in the Caucasus, and Prjevalsky, who

had succeeded Yudenitch, was compelled to ask Turkey for an armistice. The advance of the Turks began to weaken the allegiance of the Tatars to the new gov., and in March 1918 came the Brest-Litovsk Treaty making over Batum, Kars, and Ardahan to Turkey. Later Turkey increased her demands and at a conference held at Batum in May the Georgian delegates refused to accept them. The Transcaucasian Gov. had ceased to exist and an independent republic of Erivan was proclaimed for the Armenians, under Turkish protection—a Tatar republic under the same conditions—and Georgia was compelled to appeal to Germany. Germany was determined to keep control of the Baku oilfields, and therefore decided to use the Georgians as her instruments to this end. General Kress von Kressenstein was recalled from Syria and sent to the Caucasus, and Ger. troops were marched into Georgia. At a conference at Constantinople in July an attempt was made to settle Germany's differences with her ally, and the Turks were informed that they must abide by the Brest-Litovsk Treaty. The Turks ignored this Note and continued their advance towards Baku. The rift between Germany and her ally was widening. These events directly interested Britain, for not only did they prejudice the British Mesopotamian campaign, but also the whole future of Persia and the immediate hinterland of India. Events E. of the Caspian were equally disquieting. After nearly a year of contest the Soviet of Tashkend had ousted the provisional gov. of Kokhand and in May Russian Turkestan had been declared a Soviet Republic. The nearest British troops were the small contingents in Persia and Marshall's army in Mesopotamia, and their problem was to keep the road from Baghdad to the Caspian open against Turkish attacks from the W. and to check the advance of the Transcasian Bolsheviks. It was evident, too, that if the Eastern Front were to be restored the Caspian and its shipping must be controlled, which meant that Baku must be held against the Turks. A British force was sent to Transcasia and after many difficulties succeeded in inflicting a severe defeat on the Bolsheviks. This remote operation had really great political importance for Britain, since the railway from Merv to Kushk ended within two days' ride of Herat, the key to Afghanistan. In Baku itself the Bolshevik Gov. was overthrown on the night of July 25, and the new gov. asked for British assistance. They had control, for the

moment, of the shipping on the Caspian and sent transports to Enzeli to fetch the small British force under Major-General Dunsterville, which was now more than a thousand m. from its base and had to depend for assistance on the local levies, Armenian and Russian, the former of whom refused to fight on Aug. 17, and soon afterwards went home. Unexpected help, however, came to Dunsterville in his extremity from the Russian leader, Bicharov, who took Petrovsk on the Caspian, 200 m. to the N., and sent help to Baku. After a serious rearguard action the British evacuated Baku and reached Enzeli.

(xi.) **TURKS DEFEATED IN MESOPOTAMIA AND PALESTINE.**—Marshall in Mesopotamia spent the summer in consolidating his position, and when he advanced on the Tigris in Oct. it was against a beaten enemy. Although in these confused operations the Allies had failed to re-create the Eastern Front except in isolated parts, they had upset Germany's forecast of events, and it was left to Allenby in his Palestine and Syrian campaign to drive the Turks out of the War with the resultant collapse of all Germany's Eastern dreams. On Sept. 19 his troops drove back the main Turkish forces, while his cavalry burst through to the right and then, wheeling, cut off the retreat of nearly the whole of the Turkish forces. On the 22nd Allenby reported that 25,000 prisoners and 200 guns had been taken and that the 7th and 8th Turkish Armies had virtually ceased to exist. By the 25th, co-operating with the Arab forces of the Emir Faisal on the E., Allenby had rounded the Lake of Galilee, the number of his prisoners reaching 45,000. Damascus fell on the 30th, and the Fr. troops co-operating with Allenby took Beirut on Oct. 7, while the British took Sidon. On Oct. 26, Aleppo fell and on the 28th Allenby's troops reached Muslimieh, the junction on the Baghdad railway which was regarded as the nodal point in the Ger. hold on the E. Marshall's advance up the Tigris and his occupation of Mosul now compelled the Turkish army there to surrender, and on Oct. 30 an armistice was signed. The Allies were now in a position to occupy the forts on the Dardanelles and the Bosphorus and to make free use of the Straits.

(xii.) **COLLAPSE OF BULGARIA.**—Meanwhile in the Balkans events began to move towards the final collapse of Bulgaria. The Allied front in the Balkans had been quiescent since the futile offensive of May 1917, and various adjustments had taken place, the new Gk. army

replacing many of the Fr. and British troops, now representing the largest Allied contingent. In June General Franchet d'Esperey succeeded Guillaumat as Commander-in-Chief. The moral of the Bulgarian troops had begun to fail and desertions were frequent, while King Ferdinand of Bulgaria himself realising that defeat was imminent was seeking a way out of his difficulties. During July the Fr. and Italians moved forward, but were repulsed by counter-attacks. There was a lull until the middle of Sept. when the Allies launched a great attack in which the Serbian troops played a notable part. By Sept. 22, the Bulgarians had fallen back from the Dolran front closely pursued by the British and the Gks. On the 24th Fr. troops entered Prilep, capturing huge quantities of stores. By the evening of the 25th the Serbians had taken the Babuna Pass and the tm. of Ishtip; they were close to Veles, and Uskub was almost within their grasp. The Bulgarian front was cut in two, and on Sept. 30 an armistice was signed at Salonika. Meanwhile the Allied armies had been sweeping forward. On the 27th the British took Strumnitza and the Serbians captured Veles, while on the 30th Fr. cavalry entered Uskub. On Oct. 4, Ferdinand abdicated in favour of his son Boris, and retired to Hungary. The Allies advanced to the Danube. On Oct. 12 the Serbians entered Nish, their anct. cap., and by the end of the month they were in Belgrade and the last remnants of Austro-Ger. troops were cleared from the Balkans. (See *BULGARIA*.)

(xiii.) *DISINTEGRATION OF AUSTRIA-HUNGARY.—Austrian Defeat on the Piave.*—These events were the death-blow to the already disintegrating Austro-Hungarian Empire. In the last week of Oct., Count Andrássy, who had taken Burian's place as Foreign Minister, made a journey to Switzerland to attempt to negotiate with the Allies, but found no approach possible. The manifesto issued by the Emperor Karl, in which he promised a separate state to each of the races in the Empire, was acclaimed by the subject races as a sign that the central power was breaking up. On Oct. 18, the Czechoslovaks, through their provisional gov. in Paris, declared their independence, the Southern Slavs were preparing to take similar action, and on Oct. 24 there was a mutiny of the Croat garrison at Fiume. But the Austrian army in Italy was still in being, and until that army was put out of action the Empire remained. It was ironical that the only army in the league of the Central

Powers which had not suffered defeat by the third week in Oct. should have been the despised Austrian army; but actually the fine military tradition of the Austrian Empire had created a remarkable military machine, proof until now against all difficulties of restive subject peoples and Ger. interference. General Diaz, the Italian Commander-in-Chief, had now under his command contingents from almost all the chief Allied countries. Diaz aimed at driving a wedge between the Austrian forces in the mountains and those in the plain, after which he could deal with each section separately. The first step was the crossing of the Piave, now in flood, and presenting especial difficulty opposite the Italian 10th Army, commanded by the British general, Lord Cavan. The riv. here was a mile and a half broad, with innumerable rapid streams between many islands, the largest of which was called the Grave di Papadopoli, some 3 m. long. On the night of Oct. 23, the British effected a footing on the island and held the position for two days until on the 25th they were joined by other Italian and British troops, and were then able to begin the bridging of the main channel. Meanwhile the Italians had been fighting a costly holding battle on the Grappa, which the Austrians intended as the main attack to distract attention from the Piave, which they believed the floods had made safe. On the 27th the 10th Army attacked and gained several positions on the eastern shore of the Piave. Severe fighting continued until the night of the 28th, but on the 29th Cavan moved steadily forward, and on that day the Austrians were in full retreat. By the 30th Diaz had driven a wedge securely between the two halves of the Austrian front. From this stage the retreat became a rout. On the 31st the collapse became complete, for the defeat gave momentum to the political disintegration of the previous year, and Czech and Polish battalions surrendered *en masse*. On Nov. 1, the Grappa front gave way. On the 4th the British forces had crossed the Tagliamento, and by the evening of that day the 6th Army was far over the watershed and in the outskirts of Trent itself. The Austrian armies had collapsed, and left in the Allies' hands more than 300,000 prisoners and 5000 guns.

Armistice with Austria-Hungary.—On Nov. 4, an armistice came into effect and hostilities ceased. On the evening of Nov. 3, a detachment of Italian Bersaglieri landed at Trieste, and the city passed into

Italian control. Thus all Germany's allies were finally vanquished, with results already outlined. Only in one remote Ger. outpost did an audacious commander continue to resist until Nov. 25, namely in Ger. E. Africa, where an entirely isolated force had carried on a brilliant guerrilla war all through the four years of war, but with this final surrender all military operations, except in Russia, ceased.

(xlii.) PEACE TREATIES.—Treaty of Versailles, signed by the Allies and Germany, June 29, 1919, and ratified at Paris, January 10, 1920; Treaty of St. Germain-en-Laye, between the Allies and Austria, signed Sept. 10, 1919, and ratified in Paris, July 16, 1920; Treaty of Trianon, between the Allies and Hungary, signed June 4, 1920; Treaty of Neuilly, between the Allies and Bulgaria, signed Nov. 27, 1919, ratified in Paris, Aug. 9, 1920; Treaty of Sèvres, between the Allies and Turkey, signed Aug. 10, 1920, but never ratified; Treaty of Lausanne, between the Allies and Turkey, signed July 24, 1923, and ratified in the same year. For the terms of the treaties see under the names of the treaties.

(xliii.) COST OF THE GREAT WAR.—In 1924 the Bankers' Trust Company of New York issued the following estimate of War costs in pounds sterling (reprinted in *Whitaker's Almanack*, 1928).—

Nation.	Total Expenditure.
British Empire:	
Great Britain . . .	£11,076,000,000
Canada . . .	762,700,000
Australia . . .	476,700,000
New Zealand . . .	234,400,000
S. Africa . . .	159,000,000
India . . .	687,100,000
Other parts . . .	182,000,000

Total car. forward . £13,577,900,000

Total gov. expenditures, Aug. 1, 1914, to Sept. 30, 1919 . . .

Estimated normal expenditure five years, 1914-19 . . .

Loans to Allies (£1,740,000,000) of which one-half is estimated recoverable . . .

Obligations of the Dominions . . .

Obligations of India in respect of British War Loan . . .

War assets, surplus stores, etc. . . .

Arrears of excess profits duty . . .

Nation.	Total Expenditure.
Total brought fwd.	£13,577,900,000
Belgium . . .	411,800,000
France . . .	7,962,200,000
Greece . . .	115,100,000
Italy . . .	4,432,700,000
Japan . . .	419,100,000
Portugal . . .	235,300,000
Rumania . . .	308,800,000
Russia . . .	5,312,700,000
Serbia . . .	119,000,000
U.S.A. . . .	8,105,000,000

Total, Allies . £40,999,600,000

Austria-Hungary . . .	£4,068,400,000
Bulgaria . . .	261,000,000
Germany . . .	10,341,100,000
Turkey . . .	451,800,000

Total, Central Powers . £15,122,300,000

Grand Total . £56,121,900,000

The following table gives the relative cost of the Great War and the percentage of the National Wealth expended in war:—

Nation.	Per capita. \$.	National Wealth, Per cent.
Great Britain . . .	524.9	34.5
France . . .	280.2	19.4
Italy . . .	124.6	20.6
Russia . . .	44.0	13.1
U.S.A. . . .	176.9	8.7
Austria-Hungary . . .	108.8	18.1
Germany . . .	292.6	24.7

The following table, taken from H. F. Grady, *British War Finance*, 1927, shows an estimated cost of the Great War to Great Britain, a lower estimate than that given in 1924 by the Bankers' Trust Company:

Total gov. expenditures, Aug. 1, 1914, to Sept. 30, 1919 . . .	£10,271,497,360
Estimated normal expenditure five years, 1914-19 . . .	£1,000,000,000
Loans to Allies (£1,740,000,000) of which one-half is estimated recoverable . . .	870,000,000
Obligations of the Dominions . . .	200,000,000
Obligations of India in respect of British War Loan . . .	21,000,000
War assets, surplus stores, etc. . . .	425,000,000
Arrears of excess profits duty . . .	240,000,000
	<hr/> 2,756,000,000

Net cost of Great War to September 30, 1919 . . .

£7,515,497,360

The next table, taken from the *Economist*, Oct. 4, 1919, shows the extent of gov. loans in England and the increase of the British National Debt owing to the Great War:—

elsewhere was estimated in 1921 by an Allied commission at the cost of 54 billion dollars. See F. L. McVey, *Financial History of Great Britain, 1914-1918*; J. M. Keynes, *Economic*

Figures in £ million.

	Aug. 1, 1914.	March 31, 1915.	March 31, 1917.	March 31, 1918.	March 31, 1919.	Sept. 30, 1919.	Change since Aug. 1, 1914.
Funded Debt .	586.7	583.3	317.8	317.7	317.7	317.7	- 269.0
Term Annuities .	29.6	28.0	24.0	21.9	21.0	21.9	- 7.7
Unfunded Debt :							
3½ % War Stock .	—	349.1	62.7	62.7	62.7	62.7	+ 62.7
4½ % War Stock .	—	—	20.0	16.1	16.1	16.1	+ 16.1
4 and 5 % War Stock .	—	—	1,962.4	2,090.5	1,993.8	1,958.2	+ 1,958.2
Nat. War Bonds .	—	—	—	625.8	1,692.2	1,744.1	+ 1,744.1
4 % Funding Loan .	—	—	—	—	—	212.1	+ 212.1
4 % Victory Bonds .	—	—	—	—	—	201.1	+ 201.1
Treasury Bills	15.5	78.2	463.7	973.4	957.0	851.9	+ 836.4
Exchequer Bonds .	20.5	67.4	320.3	391.7	392.6	392.6	+ 372.1
War Savings Certificates .	—	—	74.5	137.7	227.3	259.3	+ 259.3
War Expend. Certificates .	—	—	23.6	22.9	—	—	—
Other Debt ¹ .	—	—	316.5	936.9	1,255.2	1,293.5	+ 1,293.5
American Loan ² .	—	—	51.4	51.4	51.4	51.4	+ 51.4
Temporary Advances .	1.0	—	217.5	192.3	456.5	395.6	+ 394.6
Other Capital Liabilities .	653.3	1,106.0	3,854.4	5,841.0	7,444.5	7,778.2	+ 7,124.9
	57.2	57.0	52.2	49.2	49.2	48.9	- 8.3
Total Liabilities	710.5	1,163.0	3,906.6	5,890.2	7,493.7	7,827.1	+ 7,116.6

¹ Includes advances from U.S. Treasury, Japanese Loan, Argentine Loan, etc.

² Means joint Anglo-Fr. Loan of 1915.

The daily cost of the Great War to Great Britain was estimated in Nov. 1914 at £900,000 to £1,000,000. By 1915 the average cost had increased to £3,000,000 per diem, while in 1918 it had reached an average figure of £6,107,000. In France military expenses and expenses caused by the War totalled at 166,034,000,000 francs, while the service of the debt contracted through War needs required a further six milliard francs. Damage due to the War in Fr. and Belgian territory and

Consequences of the Peace, 1919; H. Truchy, *Les Finances de la Guerre de la France*, 1926; G. Yèze, *Les dépenses de Guerre de la France*, 1926; H. L. Grady, *British War Finance*, 1927.

Warton, Joseph (1722-1800), an Eng. critic and poet, son of Thomas W., professor of poetry at Oxford, educated at Winchester and Oxford, where he formed a close friendship with William Collins. He wrote verses, and in his *Odes* and in his *Essay on Pope* he opposed the arti-

ciality and the moralising in verse prevalent at the time. He edited Virgil in Latin and Eng. and wrote on Shakespeare and Homer. He often met and argued with Dr. Johnson in the Literary Club. See Woolf's Life, 1806.

Warton, Thomas (1728-90), an Eng. poet-laureate and historian of poetry, brother of Joseph (q.v.). He wrote an heroic poem, *The Triumph of Isis*, *Observations on the Poetry of Spenser*, *A Dissertation on Theocritus*, and other minor works, but his chief title to fame is his *History of English Poetry*, 1774-81. See W. P. Ker, *Thomas Warton*, 1911; E. Gosse, *Joseph and Thomas Warton*, 1915; *The Three Wartons, A Choice of Their Verse*, ed. E. Partridge, 1927.

Warwick: (1) The cap. of Warwickshire, central England, on the Avon, 20 m. S.E. of Birmingham. Warwick Castle, an old feudal residence, contains fine paintings and relics, including the famous vase from Hadrian's villa at Tivoli. Caesar's Tower probably dates from the Norman Conquest, and is the oldest part of the present building. The Beauchamp Chapel of St. Mary's Church dates from 1464. With Leamington W. has formed a parl. bor. since 1885. The chief occupation is agriculture, and manufs. include agricultural implements, gelatine, and dairy products, and bricks. Two fairs are held annually, and a yearly historical pageant. Pop. (1931) 12,600. (2) A tn. of Rhode Is., U.S.A., in Kent co., on Narragansett Bay, with manufs., especially cotton. Pop. (1930) 23,196. (3) A tn. of Merivale co., Australia, on Contadamine R., in an agricultural and wine-growing dist. There are also gold and coal mines, and quarries of marble and stone. Pop. about 7000.

Warwick, Guy of, see GUY OF WARWICK.

Warwick, Richard Neville, Earl of (1428-71), surnamed the Kingmaker. He was the eldest son of the Earl of Salisbury, and married the daughter and heiress of the Earl of Warwick, succeeding to the title in 1449. He was the most active of all the supporters of the Yorkist house, and his word carried great weight in their councils. In 1455 he won the first Battle of St. Albans, and became the governor of Calais. He did not, however, attempt to dethrone Henry VI. until after the Battle of Wakefield. W. was killed at the Battle of Barnet, April 14, 1471. For further information, see ROSES, WARS OF THE.

Warwickshire, a midland co., England, bounded on the N. by Stafford-

shire, S. by Gloucestershire and Oxfordshire, E. by the shires of Leicestershire and Northampton, and W. by Worcestershire. The surface is very variable, though there are no great elevations, Broom Hill (830 ft.) being the highest. The principal rivs. are the Avon, with its numerous tributaries, which runs right across the co., the Stour, and the Tame. In the N. is the region that was once the Forest of Arden, made famous by Shakespeare. The co. possesses immense coalfields in the N.; ironstone, lime, and cement are also worked. Almost the whole co. is under cultivation, pasturage occupying the largest area; dairy farming and market gardening are carried on successfully, and oats and wheat form the main crops. In the N. is the great industrial centre of Birmingham, the principal manufs. being iron goods, hardware, firearms, jewellery, etc. Bicycles, motor cars, watches, and ribbons are manufactured at Coventry and other places. Besides the above-mentioned tns. the most important are Leamington, famous for its Spa; Nuneaton; Stratford-on-Avon, the birthplace of Shakespeare; Sutton Coldfield; and Warwick, the co. tn. The co. is divided into four parliamentary divisions, each returning one member. There is a university at Birmingham and an Edward VI. grammar school; Rugby possesses a famous public school, and at Studley Castle is the Lady Warwick Horticultural College for Women. The co. is famous for its antiquities, Warwick Castle and Kenilworth Castle being the most famous, though there are others. Coventry church is notable, and there are ruins of a Cistercian monastery at Coombe Abbey near Coventry, besides others at Merevale, Stoneleigh, Maxstone, and Wroxall. Edgehill gave its name to the battle of 1642, in the Civil War. The area of the co. is 979 sq. m. Pop. (1931) 1,534,782.

Warwickshire Regiment, Royal. This Eng. corps (late 6th Foot) was raised in 1673 for service under Dutch Gov. It came on to the British establishment in 1680 and served under William III. at Namur, 1695. At beginning of eighteenth century served as marines on both sides of the Atlantic. Reverted to a foot regiment about 1705 and suffered heavily at Almanza in Spain, 1707. After a period in the West Indies served with much distinction under Wellington in the Peninsula. Further honours were gained at Niagara, S. Africa (1846-47), Khartoum (1898), and S. Africa (1899-1902). During Great War raised thirty battalions and served

in France, Flanders, Italy, Gallipoli, Mesopotamia, and Persia.

Wasatch, see WAHSATCH MOUNTAINS.

Wash, The, an inlet (22 m. by 15 m.) of the North Sea, on the E. coast of England, between Norfolk and Lincoln cos., receiving the Welland, Ouse, Nen, and other rivs. Its shores are low and marshy. It is mostly shallow, and contains numerous shoals, its two chief channels being called the 'Deepes' of Boston and Lynn. It is the remnant of a larger bay which once covered much of the bordering Fens. Sea walls now protect the marsh lands. King John lost his baggage and treasure wagons here (1216).

Washburne, Elihu Benjamin (1816-87), an American statesman, b. at Livermore. Descended from an old family of Eng. Puritan settlers. In early life followed journalism and teaching. Studied law. Sat in Congress (1853-69) as a Whig, advocating retrenchment. Became Secretary of State under Grant. Went as American ambassador to Paris, and was present during the siege (1870). Left his art and literary treasures to Chicago. He wrote: *Recollections of a Minister to France*, 1887, and a *History of the English Settlement in Edwards County*, 1882.

Washing Machines, see LAUNDRIES.

Washington, the cap. of the U.S.A., in the District of Columbia, an area of 62 sq. m. enclosed by the state of Maryland, except in the S.W., where the Potomac R. forms the boundary. W. stands on the l. b. of the Potomac R., which is navigable for large vessels up to this point. W. was fixed in position by an Act of Congress passed in 1790, and the gov. was transferred thither from Philadelphia in 1800. George Washington himself was responsible for its original plan and took great interest in the city that was to bear his name. The city was regularly laid out, according to the design of Major L'Enfant, a Fr. engineer, and now covers an area of more than 10 sq. m. The Capitol is the central site. This splendid building stands on a rising ground at the eastern end of Pennsylvania Avenue. It is built according to the design of Sir William Thornton, a British W. Indian, educated in England. Latrobe, Bulfinch, and Walter have all left their mark on the building. The cornerstone was laid by George Washington in 1793. In 1812 the building was burnt by the British, but in 1818 and the following years it was rebuilt by Bulfinch, in considerable sympathy with the original design. It is constructed of freestone and composed of a centre and two wings. A

Corinthian portico extends the length of the centre, which is occupied by the rotunda, 96 ft. in height and diameter. The Senate Chamber is in the N. wing. Its dome is one of the most famous and beautiful in the world. The city has many other magnificent buildings, among which may be briefly named the Patent Office, the General Post Office, the National Observatory, the Corcoran Gallery of Art, the Columbian University, and the Howard (coloured) University. There are also the Georgetown University and the George Washington University. One of the latest memorials to be completed is the Lincoln Memorial, which was presented to President Warren G. Harding in 1922, fifty-seven years after the death of Lincoln. W. is, in many aspects, the most beautiful city in the U.S.A., with its white stone and marble gov. palaces and wide tree-shaded avenues. There is nothing haphazard in its growth; it was planned, and the plan has been adhered to by Congress acting through a fine arts committee. Congress, by recent Acts, appropriated 115 million dollars for new buildings. In recent years, there have been completed the building for the Dept. of Agriculture, costing 2 million dollars; the Bureau of Internal Revenue (10 million dollars); the structure for the U.S. Supreme Court (10 million dollars) is in process of building. The Dept. of Commerce (1050 ft. x 325 ft.), costing 17 million dollars, is the largest gov. office building in the world. The magnificent stone bridge across the Potomac, which has also recently been completed, is 1452 ft. long, and connects W. with the Arlington National Cemetery. W. is mainly a residential city. The U.S. Gov. employs large numbers of citizens in the offices of the various departments, and normally employs thousands of people in its engraving, printing, book-binding, and manufacturing departments. The country community is mainly agricultural, flowers and foliage plants forming 60 per cent. of the total agricultural products. Truck farms and dairying are also important. The manufs., like the agriculture, are mainly incidental to the needs of the cap. Printing and publishing are leading industries, bread and bakery products are manufactured, slaughtering and meat-packing form important occupations, ice cream is manufactured, coffee and spices are roasted and ground, drinks are made, there are planing mills, and marble, granite, and other stones are dressed. W. has railroad connections with most of the important tns. of the U.S.A. It is 38 m. from Baltimore,

136 m. from Philadelphia, and 226 m. from New York. In 1922 an important treaty, the Washington Treaty, was signed here (q.v.). The U. S. Gov. has a navy yard at W. The pop. consists chiefly of gov. officials and the various professional men and tradespeople required to minister to their wants. About 25 per cent. of the pop. is negro, the remainder white, with a few Asiatics. W. is subjected to control by Congress and by Commissioners appointed by the President and confirmed by the Senate. Since 1895 W. by Act of Congress has been made co-extensive with the District of Columbia. Pop. (1930) 486,869. See W. B. Bryan, *A History of the National Capital*, vol. i, 1790-1814, 1924; vol. ii, 1815-78, 1926; Wm. Tindall, *Standard History of the City of Washington*, 1914; C. Moore, *Washington Past and Present*, 1929. (2) A bor. of Pennsylvania, U.S.A., co. seat of Washington co., 25 m. from Pittsburgh. It is a well-built city, the seat of Washington and Jefferson Colleges and of Washington Seminary. It has iron, glass, and carbon works, steel and clay products works, and makes toy vehicles. It has coal mines and natural gas and oil wells. Pop. (1930) 24,545. (3) A tn. of Indiana, U.S.A., co. seat of Daviess co., 110 m. S.W. of Indianapolis. It is the centre of a farming and lumber region. It has railroad and machine shops, flour and sawmills, and manufs. coat-hangers, cheese, shirts, etc. Pop. 9020. (4) The co. seat of Beaufort co., N. Carolina, U.S.A., on the Pamlico R. It has an extensive trade in farm produce, cereals, and lumber. Pop. 7035.

Washington, a Pacific state of the U.S.A., was formerly part of Oregon. It is situated in the extreme N.W., bounded N. by British Columbia, E. by Idaho, S. by Oregon, W. by Pacific Ocean. It was created a territory in 1853, and in 1889 was admitted to statehood. Area, 69,127 sq. m. Pop. (1930) 1,563,396. The state is traversed from N. to S. by the Cascade Range, whose general altitude is between 6000 and 7000 ft., but there are several volcanic peaks rising above 10,000 ft. Mt. Rainier (or Tacoma) reaches 14,408 ft.; it is surrounded by a national park. There is also a lower, coastal range in the W., the Olympic Mts. In the N.W., between the two ranges, is Puget Sound, an inlet with many ramifications, and there are several indentations on the Pacific coast. The Columbia R. enters the state from British Columbia on the N. and flows along 300 m. of its S. boundary. Its chief affluent is the Snake R., which joins it near South Ainsworth. E. of the Cascades are stretches of

arid or semi-arid land, with fertile areas. Here are great cattle and sheep ranges, and here also much wheat is grown. Wheat is also grown in the W., which receives a heavy rainfall, and has a profuse vegetation. Agriculture is the chief industry, barley, oats, and maize being grown as well as wheat. Fruit is also an important product, W. having the largest apple crop of all the states. It is the first state, also, in regard to lumber, more timber (chiefly coniferous) being cut here than in any other. The mining of coal, copper, lead, magnesite, zinc, silver and gold are also carried on. The state produces 30 per cent. of the nation's magnesite and 35 per cent. of its lead. W. has a fifth of the U.S. water-power resources; seven plants have already been installed on the Spokane. Industrial establishments include lumber and planing mills, and flour mills; meat-packing and the manufacture of dairy products are important. On Puget Sound, which abounds in holiday resorts, are many excellent harbours. Seattle is the landing-place of the N. Pacific fisheries and handles also the bulk of the Alaskan trade and much Asiatic and Panama Canal trade. There are eighteen Indian reservations in the state, covering an area (1928) of 1335 sq. m., the largest being that of Coleville. The cap. is Olympia, and the chief cities are Seattle, Tacoma, Spokane, Bellingham, and Everett. The University of Washington near Seattle had an attendance in 1927 of 10,169 students. See E. S. Meary, *History of the State of Washington*, 1924.

Washington, par., Durham, England, 6 m. from Gateshead; has coal-mines. Pop. (1931) 17,000.

Washington, George (1732-99), first President of the U.S.A., was b. at Bridge's Creek, Westmoreland co., Virginia, Feb. 22. He was descended from pure British stock. His family originated at Sulgrave Manor, Northamptonshire, from which his great-grandfather, John W., migrated in 1657. His own father, Augustine, married twice, having four children by his first wife, and six by his second, Mary Ball, of whom George was the eldest. He received an indifferent education in such schools as were established at the time. Largely self-taught, he learned to survey land, and at sixteen Thomas, Lord Fairfax, who had come over from England to live for a time on his vast plantations, made W. his surveyor, and a year later secured for him the position of public surveyor. The senior W. left most of his estate to his sons Lawrence and Augustine. Lawrence was made guardian of

George W., and later made him executor of his will and ultimately heir to his big plantations. The only journey G. W. ever took out of the territorial confines of the U.S.A. was with his guardian to the West Indies and it was there that G. W. contracted small-pox, which left his features pitted for the rest of his life. When G. W. became master of his brother's home, Mount Vernon, he settled down to the life of a country gentleman. He had made a good impression on Governor Dinwiddie, and the latter soon made him Adjutant of the Virginia military. England and France were then about to engage in war in Europe (1754). In N. America their interests clashed, both countries claiming the territory bordering the Ohio river. The Fr. were preparing to build a series of forts in the forest wilderness to make good their claim to the Ohio Valley. W. was ordered to drive the Fr. out of Ft. Duquesne, and on May 28 met a small detachment under Captain de Jumonville. An engagement followed in which Jumonville and nine others were killed. Ensign Monceau escaped with the newsto Ft. Duquesne. The rest surrendered. The Fr., angered by the attack, sent a force of 500, accompanied by bands of Indians hostile to the Virginians. W. had to stand siege at Fort Necessity and on July 4 surrendered. Later, when General Braddock, sent by the Eng. gov. to take charge of military affairs, set out to capture Fort Duquesne, W. was one of his aides. In a forest engagement against a large force of Fr. and Indians, Braddock was mortally wounded. W. had several horses shot under him, and the Eng. were forced to retreat. W. now resigned his command of the Virginia troops whom for so long he had sought to train and discipline, often in vain. He was tired of military glory and wanted to settle down and found a family. He had been rejected by two young women to whom he had paid suit. But the love of his life was Sally Cary, who had married his friend and neighbour William Fairfax. She reciprocated his affection. But here no case of 'honour rooted in dishonour' stood. W. contented himself by making a marriage of affection and mutual interests with a charming widow, Martha Custis, who had not only two children surviving from her former marriage, but a large fortune. The union of their plantations made W. one of the wealthiest men in his state. W. threw himself into the work of looking after his estates, and made a special study of scientific methods of tobacco culture, buying

from Europe every good treatise he could find. He entertained lavishly, and thus came into contact with notable men from all over the Eng. colonies in America. He was elected to the Virginia House of Burgesses and re-elected. He took a modest part in its deliberations. But he soon displayed a growing interest in the disputes between the colonies and the Eng. Crown. He was no loyal Tory. His heart was with his own people. When the Governor dismissed the House of Burgesses, W. took part in their unofficial meeting at which strong resolutions were adopted. When things were hastening to a clash of arms, W. did not indulge in florid oratory. As a practical man he declared himself ready to raise one thousand men at his own expense and himself march with them to Boston. Virginia at once elected him as one of its delegates to the First Continental Congress. He appeared in Philadelphia wearing the blue and buff uniform of a soldier. His reputation as a great landed aristocrat had preceded him. Everybody knew him as one who had been tested under the fire of enemy guns. He spoke little in public, but much in private. He was to be seen at all the inns, dining now with Southerners, now with the men from New England. On Sundays he attended services of the different cults. In Philadelphia he bought arms and munitions which he sent to Virginia. When the Congress adjourned, he returned to Virginia to take up the active training of the raw soldiers. His name was now on all lips. When the Second Continental Congress met in Philadelphia, the general feeling among the New Englanders was that they must have a Southern man to lead them. Only thus could they be sure of uniting the colonies in one common cause. The predestined Southerner was W. War had already started. John Adams (*q.v.*) proposed W. as commander-in-chief of the colonial armies and on June 15, 1775, W. found himself charged with the heavy responsibilities of that post. The colonies were jealous of each other. There was at first little cohesion between the soldiers from the different sections. The American troops often lacked arms, munitions, food and clothes. W. had to combat treachery among his generals. Charles Lee failed him in the New Jersey campaign and wrote vicious letters to Congress. Later there was a cabal, led by Thomas Conway, to overthrow W. and replace him by General Gates. Still later came the episode of Benedict Arnold's (*q.v.*) treachery at West Point. W. did not shine in the

early years of the war as a great soldier, but revealed splendid traits as a man. He was generous, just and high-souled. He took no pay for his services, contenting himself with his bare expenses. Knowing the jealousy of Congress, he kept in close touch with it, and let its members know his every move and every motive. Ever careful of the well-being of his men, he constantly besought Congress to send them their supplies and their pay. When he took charge of the American forces at Boston he won a notable success. His occupation of Dorchester Heights compelled Howe to evacuate Boston in March 1776, and from that time on



[D. McLeish

SULGRAVE MANOR, THE ANCESTRAL HOME OF THE WASHINGTON FAMILY, NORTHAMPTONSHIRE

The manor-house was built by Lawrence Washington about the middle of the sixteenth century and bears the Washington coat-of-arms on the porch

Massachusetts never again saw any of the fighting. He now had a succession of reverses, notably at the Battle of Brooklyn Heights; but in New Jersey he turned and beat his enemy at Trenton and Princeton. The American cause was now attracting to the country many European soldiers, including Kosciuszko and Pulaski from Poland, the Ger. Baron von Steuben and Baron de Kalb, and Lafayette from France. Lafayette became a member of W.'s own staff and one of his closest friends. Following his defeats in the Battles of the Brandywine and Germantown in the autumn of 1777, W. led his 11,000 men into winter camp at Valley Forge, 20 m. from Philadelphia, their bare feet staining the snow with

their blood. It was W.'s darkest hour in the war. Congress utterly failed in its duty to its soldiers, who only held together from respect and affection for their leader. With the spring came a change for the better. The Fr. were coming into the war. Clinton, who succeeded Howe, had been ordered to give up Philadelphia and return to New York. W. harassed his troops, notably at the Battle of Monmouth, which might have been a complete victory but for the dubious conduct of Charles Lee. When Clinton reached New York, W. took up a position at White Plains and for three years, while fighting was going on elsewhere, the two armies watched each other. At last, W.'s chance came when Cornwallis met with difficulties in N. Carolina and withdrew his army to Virginia, and finally shut himself up in Yorktown. De Grasse, having landed 4000 men to strengthen Lafayette's forces, defeated Admiral Hood in a naval action, with the result that Cornwallis was helpless. Though the serious distractions in Europe determined the Eng. gov. to make peace, the strategy of W. in rushing his army to the S. at the right moment, also contributed to the Eng. defeat. When the British finally moved out of New York for home the American army under W. entered the tn. A few days afterwards, on Dec. 4, 1783, W. bade farewell to his officers, and went to Philadelphia, where he left with the Comptroller an account of his expenses, and then proceeded to Annapolis, Maryland, where Congress was sitting. Here on Dec. 23 he resigned his commission as commander of the armies. Two days later, like Cincinnatus, he had returned to the plough, and for four years strove to recoup his shattered fortunes. In the meantime the country seemed to be drifting into anarchy; but at length it was decided to call a convention to frame a constitution, and W. was chosen as one of the Virginia delegation. The convention opened May 13, 1787, in Philadelphia, and W. was unanimously chosen to preside. Others wrote the constitution, but it was W. who did much to remove difficulties. He was unanimously chosen as first President of the republic, although he was reluctant to assume the burden. He was inaugurated April 30, 1789. Since a President of a republic was a new political phenomenon, W. wished to ensure respect for the office. He rode in a coach with outriders in brilliant livery. At his receptions he wore a black velvet suit, shoes with gold buckles, yellow gloves,

powdered hair, a cocked hat with an ostrich plume and a sword in a white scabbard. His enemies said he had kindly ambitions, but there is no proof that this was so. (See UNITED STATES OF AMERICA—History for the events of W.'s presidency.) W. wished to retire at the end of his first term, but at the instance of the rival leaders, Thomas Jefferson and Alexander Hamilton, he was elected to a second term by a unanimous vote. He declined a third term, for not only did he now long for the quiet of Mount Vernon, but he was weary of the unjust attacks of bitter partisans. In giving up office he made a famous farewell address, warning the country against entangling alliances and to keep aloof from European quarrels. In the main that has ever since been the policy of his country. Some two and a half years later he had an attack of acute laryngitis and died Dec. 14, 1799. The years have not diminished his stature. His early biographers, like Parson Weems, with his silly cherry-tree story, imposed upon posterity a W. who was a mixture of prig, Sunday-school hero and cold-marble statue. He was none of these. The real W., usually so calm, could give way to blazing angers, loved picnics and barbecues, was an ardent dancer and had flirtations, attended the races and ran some of his own horses, hunted and fished and rode to hounds, played cards for money, had considerable bills at clubs for the liquor he drank with his friends—indeed was very much a human being understandable of men. The bicentenary of his birth was celebrated in 1932 not only by his own people, but all over the world. It is a symbol of the friendship between England and the U.S.A. and of the generosity of the Eng. that in London, the heart of the Empire, in a conspicuous place there stands the statue of the man who more than any other took from England one of her greatest possessions and made an independent nation of it.

Washington, Mount, culminating peak of the White Mts., in the Presidential Range, Coos co., New Hampshire, U.S.A. It is 6293 ft. high and ascended by a railway (1869) and a carriage road. Tuckerman's Ravine is a deep gorge in the S.E.

Washington Conference (1921). In 1921 the U.S.A. invited the other Great Powers to a conference on the reduction of naval armaments. The conference assembled at Washington in November under the chairmanship of Mr. Hughes, Secretary of State, who, in his opening speech, stated that the U.S.A. proposed that there

should be a naval 'holiday' for at least ten years. The Powers agreed that the total capital ship replacement tonnage (metric tons) should not exceed in standard displacement—U.S.A. and British Empire, 533,400 each; France and Italy, 177,800 each; Japan, 320,040. No capital ship exceeding 35,360 m. tons to be constructed by the Powers and no gun to be of greater calibre than 16 in.; aircraft carriers not to exceed a standard displacement in m. tons as follows: U.S.A. and Great Britain, 137,160 each; France and Italy, 60,960; Japan, 82,296. In future construction no ship to carry a gun of greater calibre than 8 in. Merchant ships in time of peace not to be made for the installation of warlike armament for conversion to warships other than the stiffening of decks for the mounting of guns not exceeding 6 in. No ship to be disposed of for the purpose of becoming a warship of a foreign Power. U.S.A., Great Britain, and Japan agreed to the *status quo* at the time of signing the treaty (Feb. 6, 1922) regarding fortifications and naval bases. Chapter II, Part 1, of the treaty laid down the warships which each country was to maintain; Part 2 dealt with those which were to be scrapped, and Part 3 with replacements. Capital ships and aircraft carriers may be replaced twenty years from date of completion. A treaty dealing with the protection of lives of neutrals and non-combatants at sea in war-time was also concluded. A sub-committee investigated the question of the limitation of aircraft, but no treaty was concluded thereon.

Washington, Treaties of: (1) That made in 1846 with Great Britain by which the boundary W. of the Rocky Mts. was established. (2) That made in 1854 with Great Britain relative to fisheries, duties, and navigation in British N. America, often called the 'Reciprocity' Treaty. (3) That made in 1871 with Great Britain for the settlement of all causes of difference. Under its terms the *Alabama* claims, the San Juan boundaries, and certain fisheries disputes were settled by arbitration. This treaty further laid down the following rules: That it is the duty of a neutral state, which desires to remain at peace with belligerents, and to enjoy the rights of neutrality, to abstain from participating in the war, and to see that no acts be committed by anyone in the territory which would constitute co-operation in the war. (4) The treaty of 1922, concluded Feb. 1, 1922, the High Contracting Powers being the U.S.A., British Empire.

France, and Japan. The treaty dealt with the Pacific question, and the parties agreed to settle all questions by conference; the fundamental provision being that if any one of them was threatened by the aggressive action of another Power, they would act together as the situation demanded; the treaty to remain in force for ten years and then to continue in force with the right of any Power to terminate it upon twelve months' notice. The treaty applied to the Mandated Islands in the Pacific Ocean, but the fact that the U.S.A. signed the treaty was not to imply that she assented to the mandates. A communication was sent to the Netherlands making it clear that the rights of that country in the Pacific would be respected. Another treaty was concluded between the U.S.A., Belgium, British Empire, China, France, Italy, Japan, the Netherlands, and Portugal relating to principles and policies to be followed in matters concerning China. It was agreed to respect the sovereignty, the independence, and the territorial and administrative integrity of China, to give her every opportunity of developing herself, to use influence in establishing and maintaining the principle of equal opportunity for commerce and industry of all nations throughout China, and not to take advantage of conditions in China for the purpose of obtaining special rights or privileges. Several other resolutions were adopted relating to affairs in China, such as those connected with customs and railways.

Washington Court-House, the co. seat of Fayette co., Ohio, U.S.A., on Sugar (Point) Creek, an important railway centre. It has agriculture and live-stock industry. It has a poultry-packing house, and manufs. of furniture, stoves, soap, shoes, flour, fertilisers, and candy. There are machine shops, canning factories, and creameries. Pop. (1930) 8426.

Washita, see OUACHITA.

Wasp, a name given to various hymenopterous insects. The Vespidae or true Ws. are distributed throughout the world, though most numerous in the tropics. The social Ws. (Vespinae), which form a sub-family, almost all employ undeveloped females for workers. The community is of seasonal duration only; the mother or queen, after hibernating, emerges in the early spring and builds a nest of paper worked up with her mandibles from vegetable substances. She constructs six or eight six-sided cells and in them lays eggs from which grubs quickly hatch. They are fed on honey and insects, and when the grubs are full-

grown the cells are sealed up and the larvæ change into pupæ and again into young workers. These continue the construction of the nest and the care of the young, leaving the queen to devote herself chiefly to egg-laying until the nest contains some hundred inmates. Not until the end of the season are drones and fully-developed females produced. These leave the nest, and, after pairing, the females seek shelter for the winter. It is the destruction of the queen Ws. in early spring by cold weather and human agency that checks the numbers of Ws., but while they are enemies of the fruit-grower, they destroy great numbers of other insects. The other sub-family of the Vespidae is the Euminae (solitary Ws.), which usually make earthen nests, capturing and storing insects as food. All the females are fully developed, and, although there are no social communities, a stage in the development of communal life is seen in certain species, which build their cells close together. There are three hymenopterous families of digging Ws.: the Scoliidæ, the females of which search for beetles' larvæ in the ground, paralyse them with their sting, and lay an egg on the body; the Pompilidæ, which construct their nests in sandy banks, capturing spiders to feed their grubs; and the Sphegidae, which make nests in the ground or in wood, and capture insects to furnish food for their larvæ.

Wassail (A.-S. *was* and *hal*, be thou whole, of good health), originally an expression of good wishes at festivities, especially a 'toasting' or salutation in drinking. Later it was used for a drinking-bout or carouse, and then for the beverage used (especially at Christmas and New Year). This consisted of spiced ale (or wine), sweetened, and flavoured with cinnamon, cloves, roasted apples, toast, etc. It is sometimes called 'lamb's wool.'

Wassermann, Jakob, Ger. novelist, b. March 10, 1873, in Fürth, Bavaria, of Jewish parents. His novels are a study of post-war conditions and problems, and W. has been called the Ger. Balzac. Perhaps his greatest novel is *Christian Wahnschaffe* (1919; Eng. trans. *The World's Illusion*, 1921). Other novels in Eng. trans. are *The Triumph of Youth*, 1928; *Faber, or the Lost Years*, 1930; *The Maurizius Case*, 1930; *Eitel Andergast*, 1932; *Wedlock*, 1932.

Waste, in law a term denoting any spoil or destruction done or permitted by the tenant to houses, woods, lands, or other corporeal hereditaments (q.v.) during the continuance of his particular estate (q.v.) therein. W. is said to be either (a) *voluntary*, i.e.

acts of commission, such as pulling down buildings, felling timber, opening mines, etc.; (b) *permissive*, i.e. acts of omission such as non-repair of buildings. A tenant for life, even though expressly declared by the settlement to be 'not impeachable' for W., is nevertheless liable for equitable W. The remedy for W. is by action for damages and injunction (q.v.). See also TIMBER.

Waste Lands, see LAND RECLAMATION.

Waste Products, see REFUSE, DISPOSAL OF.

Watch, on board ship, one of the two parts (starboard and port Ws.) into which the crew is divided for the purpose of taking duty alternately. The term is also applied to the periods of duty worked. In the British navy the night is divided into three Ws., from 8 to 12, first W., from 12 to 4, middle W., from 4 to 8, morning W. The day has four Ws., 8 to midday, midday to 4, and the 'dog-watches,' 4 to 6 and 6 to 8, whose purpose is to change the turn. The list of men appointed to watch is known as the 'watch-bill.' Time is shown by the striking of the 'watch-bell,' which is struck once for every half-hour. Thus 12.30 a.m. is one bell in the middle W., and 3 a.m. is six bells.

Watches. The main features of the modern W. are its balance wheel and controlling hair-spring, its escapement, the main spring, which provides the driving power, and the system of geared wheels that drive the hands of the W. The oscillations of the balance wheel control the escapement action and it is therefore essential to have a balance wheel that will maintain the same rate of oscillation under all temperature conditions. This is now achieved by using *invar*, an alloy of 64 per cent. of steel and 36 per cent. of nickel, as the metal from which the balance wheel is made. *Invar* has a negligible coefficient of expansion, so that the balance wheel is not affected by changes of temperature. An alternative device is to make the rim of the balance wheel of two strips of metal, brass and steel; the wheel has two spokes and the rim is divided. On each section of the rim a weight is mounted and the effect of a change of temperature lengthens the spokes, but owing to the differential expansion of the compound rim, the weights are brought nearer to the centre of the wheel and exact compensation is thus achieved. Regulation is obtained by moving a short arm that lengthens or shortens the effective length of the spiral hair-spring. The moving parts of good Ws. are mounted on jewelled bearings, and rubies and sapphires

are employed for this purpose. Mass-production of Ws. owes its development to American manufacturers and in particular to Ingersoll. The parts are stamped out by machinery, and they are therefore standardised, so that it is a simple matter to repair a defective W. Ws. can be submitted to the National Physical Laboratory at Teddington for a series of rigorous tests, as a result of which a Kew Certificate A or B may be issued. See *Britten, Old Clocks and Watches and Their Makers*; Bolton, *Time Measurement*. For historical data on W. see HOROLOGY—*Watches*.

Water. W. covers 72 per cent. of the surface of the globe and occupies depressions greater than the land above sea-level could fill. It solidifies and evaporates at normal earth temperatures, and in the state of vapour forms a minute but extremely important constituent of the atmosphere. It freezes at 0° C., 32° F., and boils under 760 mm. mercury at 100° C., 212° F. On freezing it expands by $\frac{1}{9}$ its bulk; 1 c.cm. weighs 1 gram at 4° C., 39.2° F., or 1 cub. ft. weighs 62.425 lb., its greatest density, and it forms the unit of specific gravity. At 62° F. it is 8.15 times the weight of air, which in the ordinary state contains about 4 grains of W. per cubic foot. Seven-eighths of the animal body is composed of W. Chemically, it is composed of 2 volumes of H to 1 of O, the proportions by weight being 1:8. It may be prepared by exploding a mixture of those gases in proper proportion, or by burning one in the other. The combustion of most H compounds is accompanied by the formation of W. W. is, when pure, a faint greenish-blue and odourless; it is very slightly compressible, and a bad conductor of heat and electricity. It has the highest specific heat of any substance known, and is thus the best cooler through a given range of temperature; 536 calories per gram are required to convert it into steam at 212° F., while 80 are required to turn ice into W. Chemically, W. is neutral, forming acids with anhydrides. Its solvent action on many substances renders it very active, and brings about reactions between dissolved substances; with some of these it forms hydrates, with others it enters into their crystal growth as W. of crystallisation. Potassium, sodium, and some other metals decompose it. It is generally held that the earliest forms of life occurred in W., and there is a greater quantity of life present in it than out of it. Its change of form and mobility has immense effects on the earth, distributing the sun's heat, shielding the land from excessive temperatures,

eroding the land surface. The pressure it exerts on freezing, not less than 30,000 lb. per sq. in., bursts iron pipes and disintegrates rocks. Naturally, its purest form is rain, which, however, contains dust and gases dissolved from the atmosphere. It exerts a solvent effect on many rocks and enters into their crystalline structure; by virtue of its solvent action on CO₂ in the atmosphere, this effect is increased, and all natural Ws. contain matters in solution. (For composition of oceanic Ws., see OCEAN.) Calcium and magnesium bicarbonates, calcium chloride, and sulphate are the cause of hard W. The dissolved air in all natural W. is indispensable for life in W. The presence of air and salts is beneficial in W. for domestic use: the presence of organic matter is injurious; for drinking, W. should have no solvent action on the lead pipes, or contain much magnesium salt, nor should it be soft. The presence of organic matter allows W. to be the home of injurious germs, and it is thus the cause of spreading disease. It is usual to analyse W. chemically and bacteriologically. Filtering is useful chiefly as holding back organic remains; boiling renders it much more harmless, if not totally so, only a few probably harmless spores being able to resist the temperature.

See A. A. Pollitt, *Technology of Water*, 1924; M. F. Stein, *Water Purification Plants*, 3rd ed. rev., 1926; G. C. Whipple, *Microscopy of Drinking Water*, 4th ed. rev., 1927; J. P. Partington, *Composition of Water*, 1928. See also WATER MEASUREMENTS; WATER-SOFTENING; WATER SUPPLY.

Water-beetles, see DYTISCIDÆ.

Water-boatman, see BOAT-FLY.

Waterbury, a city of New Haven co., Connecticut, U.S.A., on Naugatuck R., 18 m. N.N.W. of New Haven. One of the chief manufacturing cities of the state, it produces clocks and all kinds of metal-ware and the noted 'W. watches.' Pearl buttons, lamps, chemicals, knitted goods, and boots and shoes are also manufactured. W. is the centre of the brass industry and manufs. brass and copper goods. It contains the Bronson Library (1870) and other fine public buildings. Pop. (1930) 99,902.

Water-Caltrop, see TRAPA.

Water-clock, see CLEPSYDRA.

Water-colours, pigments which are transferred from the cakes in which they are prepared to the paper or other painting-surface by being suspended in water. The various colours are sometimes supplied in hard cakes, in which case they have to be ground by rubbing on a palette and mixed with water to the desired consistency.

Another convenient form is that of fairly soft cakes prepared by mixing the colour substance with a slowly drying gum. A still handier form is prepared by adding a small quantity of glycerine, which results in a moist colour suitable for storage in collapsible tubes; it is to be remarked, however, that unless the colour is used in great quantity, many tubes are apt to be wasted by the drying of glycerine. The painting-surface is usually paper, a fairly rough surface being preferable; care should be taken that the right side, i.e. that on which the maker's watermark can be read, is used. Brushes are made of brown or red sable, and should come to a distinct point without singly-projecting hairs. Theoretically, the colours required are a perfect red, a perfect yellow, and a perfect blue. In practice, however, a large variety of pigments are called upon, some of which are opaque and some transparent. Variations of tint are obtained in the case of opaque pigments by mixing the colours in the right proportions. With transparent colours, beautiful effects are obtained by superposing thin washes of pigment on one another. The following are more or less opaque: lemon, yellow, yellow ochre, India yellow, emerald green, cobalt, raw umber, and burnt umber; while raw sienna, burnt sienna, gamboge, Antwerp blue, madder brown, and vandyke brown are transparent. A most useful pigment is Chinese white, which is usually kept moist in bottles or tubes. It not only gives a white of peculiar density, but many effects difficult to achieve otherwise are obtained by glazing over a foundation of Chinese white with transparent pigments. The use of transparent colours demands great patience as well as skill. The paper is usually slightly damped before the wash is put on. Each colour should be allowed to dry perfectly before another wash is superposed, but the dry surface may be damped again with clear water before each succeeding colour. Many devices are resorted to for producing the delicate gradation of colour which is characteristic of water-colour painting. Water-colour was in the past, and still is, used by painters for taking notes and sketches of subjects later to be produced in oils. In the eighteenth century water-colour painting became a separate art, developing from the tinted drawings of the period. It has become a peculiarly Eng. art, possibly because it is especially suited to landscape and is an admirable medium to render atmospheric effects. Two chief schools of water-colour painters arose, those

who used pure water-colours, transparent and semi-transparent, and those who mixed them with body colour. Sandby and Cozens are among the earliest of Eng. water-colour painters. Those of the greatest importance who lived at the end of the eighteenth century are John Sell Cotman, one of the best of the Norwich School, and distinguished by his broad treatment of masses, Thomas Girtin, Peter de Wint, Turner, who successfully combined various methods of water-colour painting, Constable, Cox, J. Abbott, F. Towne, Francia, J. Varley, S. Prout Calow, and also, but separated by his individual subject-matter, William Blake. At the end of the nineteenth century water-colour painting declined, becoming over-burdened with detail, but in the twentieth century the art has recovered much of its vitality in the work of Sargent, Steer, Rich, T. Innes, and Paul Nash. See Redgrave, *History of Water-colour Painting in England, 1750-1889*; E. B. Lintott, *The Art of Water-colour Painting*, 1926; E. B. Cundall, *History of British Water-colour Painting*, 1929.

Water-cress, see CRESS.

Water Cure, see HYDROTHERAPY.

Waterfalls are typical of regions where streams are young or immature, not having had time to grade their courses. Tributaries gathering less water often fall into rivs. of larger volume, erosive action being less in the former. Falls are numerous where coastal plains of a younger type and poorly resistant strata are crossed by older rivs.; a *fall-line* exists along the inner margin of the coastal plain adjoining the older land. Actual uplift of land may occur, giving rise to rapids or falls in the riv. Most W., however, are due to a river crossing strata at the outcrops, of different degrees of resistance, the valley in softer rock being deeper than that in the harder. In anct. glaciated regions rivs. often fall over hard strata which have been buried. Manchester, Lovell, and Lawrence are important tns. whose sites are determined by such falls on the Merrimac. The upland course of the Niagara R. is pre-glacial, the lower course, below the gorge, post-glacial. W. work themselves backward through the hard rock, chiefly by undermining at the base; in the case of the Niagara and Zambesi, narrow gorges with dangerous currents occur between the present and original sites of the falls. Some of the most picturesque W. are formed by springs issuing from cliff-walls in mountainous regions. Among famous W. are Niagara (170 ft.), noted for the

volume of water flowing over; Victoria (400 ft.), noted for its narrow chasm and zigzag gorge, due to faulting in volcanic rock; Yosemite (2660 ft.); Sutherland, New Zealand (1900 ft.); the Staubbach, Alps (870 ft.). There is every gradation between vertical falls and rapids; the deciding features being chiefly the nature and inclination of the rock: when made up of many layers, rapids usually result. African rivs. are nearly all obstructed by falls or rapids towards the coast, the whole continent being formed of horizontal strata. W. have been used to generate power by means of water-wheels for centuries past; turbines are replacing them, and are particularly used for generating electricity by turning dynamos. The effect, industrially, of this is very great. Factories are migrating from regions near the Alps to the foot of them, and countries without coal but with W. are establishing important manufs. W. are being brought more and more into use for the generation of electrical energy.

Waterford: (1) A co. in the prov. of Munster, Irish Free State, bounded on the N. by Kilkenny and Tipperary, S. by the Atlantic, E. by Waterford Harbour and Wexford, and W. by Cork. The coast-line is much indented, the principal inlets being W. Harbour, Tramore Bay, Dungarvan Harbour, Ardmore Bay, and Youghal Harbour. The dists. to the N. and N.W. are mountainous, the chief ranges being the Comeragh and Monavallagh Mts. (2597 ft.), the Knockmealdown Mts. (2605 ft.), and the Drum Hills (990 ft.) in the S.W. The principal rivs. are the Suir and the Blackwater, famous for the salmon fishing. Agriculture is successfully carried on, but the greatest area is under pasturage, and the rearing of livestock is increasing; the principal crops are oats, potatoes, and turnips. The fisheries form one of the chief industries, cotton is manufactured, and there are breweries, distilleries, and flour mills. Marble and copper are found. The chief tns. are W., Dungarvan, and Lismore. The co. returns four members to the Dail Eireann. W. was, in the tenth century, inhabited by the Danes, of whom there are numerous relics. At Lismore there is an old castle, at Ardmore seventh-century monastic remains and a holy well, and at Mulleray there is a Trappist monastery (1830). Area 717 sq. m. Pop. 84,000. (2) A mun., parl., and co. bor. and city, cap. of co. Waterford, Irish Free State. It is situated on the R. Suir. A wooden bridge with thirty-nine arches connects it with the suburb of Ferrybank on the

N. bank of the riv. It contains Protestant and Rom. Catholic cathedrals; also a tn. hall, law courts, and barracks. Fragments of the old city walls remain, notably Reginald's Tower, dating from the eleventh century. A large export trade is carried on, especially in bacon and butter. The harbour is formed by the estuary of the Suir and Barrow. There is steamer communication with Fishguard, Glasgow, Liverpool, Bristol, etc., besides the other Irish ports, among which it ranks second. W. was wrested from the Danes by Strongbow in 1171. Prince John landed there in 1185, and afterwards as king in 1210. Richard II. landed there in 1394 and 1399. James II. sailed from there to France after the Battle of the Boyne, and William sailed from there to England. During the Civil War it was taken by Ireton. It received its first charter from King John in 1206. Pop. 27,500.

Water Glass, *see* SOLUBLE GLASS.

Water Hemlock, Cowbane, or *Cicuta virosa*, a tall umbelliferous perennial, growing in damp places, bearing large umbels of white flowers. Its turnip-shaped root is poisonous.

Water-hen, *see* MOORHEN.

Waterland, Daniel (1683-1740), an Eng. theologian, studied at Cambridge from 1699. The Earl of Surrey was his patron. W. became canon of Windsor (1727), archdeacon of Middlesex and vicar of Twickenham (1730). His principal works were on the Arian controversy, and he was considered to have extinguished Arianism in England and proved the fact of Christ's divinity. Among his publications were *Queries in Vindication of Christ's Divinity* (1719-23) and the *Further Defence* in answer to S. Clarke (1725); *Scripture Vindicated* in answer to Tyndal (1734) and *Review of the Eucharist*, 1737. *See* Van Mildert's ed. of his *Works* with *Memoir* (1823-28).

Water-lily, the name given to the various species of Nymphaea and Nuphar and also of Nelumbium, all belonging to the natural order Nymphaeaceae. Britain produces white and yellow W.-ls., which are found floating in still waters. *See* Conrad, *Water-lilies*, 1905.

Waterloo, a vil. situated a few m. S. of Brussels, chosen by the Duke of Wellington, from its strategic position relatively to the line of fortresses on the N.E. frontier of France, as the most advantageous place to resist the advance of Napoleon on the Belgian cap. The outstanding features of this battle, June 18-19, 1815, were the extraordinary and long-continued resistance of the

British infantry to the unrelenting cannonade of the Fr. artillery, the dramatic arrival of Blücher and Bülow with three corps of the Prussian army, and the routing of Napoleon's celebrated 'Old Guard' under Ney. Creasy gives the following figures of the respective strengths of the two armies: Wellington, 49,608 infantry, 12,402 cavalry, 5645 artillery with 156 guns (of which total, scarcely 24,000 were British); Napoleon, 48,950 infantry, 15,765 cavalry, 7232 artillery with 246 guns (comprising 'the flower of the national forces of France'). The British occupied a position facing W., and across the main routes from Brussels to Charleroi and Nivelles. The central body held the building and gardens of Hougoumont, the left centre the farm of La Haye Sainte. Napoleon concentrated his army on a low range of hills facing the British position, and after despatching a corps to watch the Prussian advances he began the action with a fierce attack upon Hougoumont. Throughout the day he sent column after column of infantry to the point, strengthened his attack with repeated cavalry charges, and all through maintained a terrific artillery fire; but the British infantry, under the indomitable Picton, in spite of the weakness of their Dutch and Belgian allies, held out to the end of the day, and in the course of this heroic resistance, the Union Cavalry Brigade of British Royals, Scots Greys, and Irish Inniskillings galloped out. They rendered seventy-four of Ney's guns useless. Napoleon took La Haye Sainte late in the day, but only when Blücher and Bülow were pressing his right. This divided his attentions between offensive and defensive, and he was obliged to send out the Young Guard to occupy Planchenoit village, the defence of which had become absolutely vital to the safety of the Fr. But the battle was over from this time, for other Prussian forces were constantly appearing nearer and nearer to the Eng. left near Papelotte and from St. Lambert. As a last resort Napoleon endeavoured in vain to break the British line with the Old Guard under Ney; Wellington then took the offensive, advanced with his whole army, and routed the Fr. The losses were enormous: British, 15,000 killed and wounded; Prussians, 7000; Fr., unknown. *See* J. S. Kennedy, *Waterloo*, 1865; A. F. Becke, *Napoleon and Waterloo*, 1914; also Wellington's despatches.

Waterloo: (1) The co. seat of Black Hawk co., Iowa, U.S.A., on Cedar R., 52 m. from Cedar Rapids, 6 m. from Cedar Falls. Agriculture, dairying,

and poultry-raising are the chief pursuits. There are foundries, canning and packing industries, and various manufs., especially of farm implements, tractors and separators. There are good water power and electric power plants. Pop. 46,191. (2) A municipality of New S. Wales, Australia, a suburb of Sydney (2½ m. distant). Pop. 9500.

Waterloo Bridge. The oldest existent London bridge crossing the Thames. It was built by Sir John Rennie (who also built London Bridge) between 1811 and 1817. W. B. is considered by many judges to be the finest bridge in stone. The piers and buttresses are built on wooden platforms which in turn stand on timber piles driven into the clay of the riv.-bed. Approached by a short ascent on the Southwark side, its final arch crosses over the Victoria Embankment on the level of the Strand. After a hundred years useful service W. B. recently began to subside seriously in the centre, and required to be supported by a timber construction. In 1932 the L.C.C. Improvements Committee recommended the Council to agree to the reconstruction and widening of W. B. to take six lines of vehicular traffic. The estimated cost of the new bridge is £1,295,000. In their report the Committee stated that the alternative course of reconditioning involved, in substance, almost complete demolition and reconstruction. The report also gives figures on the settlement of the piers of the bridge from May 1924 to November 1931, which reveal a settlement of one pier of nearly 3 in. and, in two other cases, subsidences of 1½ in. These are given as indications that the bridge is unstable and that a rapid subsidence of a great part of the whole structure might develop at any moment.

Waterloo Cup, The, *see* COURSING.

Waterloo-with-Seaforth, a tn. and watering-place of Lancashire (S.W. coast), England, on the Irish Sea, at the Mersey's mouth, a residential suburb (N.W.) of Liverpool (5 m. distant). Pop. (1931) 31,200.

Waterlow, Sir Ernest Albert (1850-1919), Eng. painter; b. May 24, in London; son of A. C. W., lithographer. Educated: Eltham Collegiate School; Heidelberg. Entered R.A. Schools, 1872; Turner Gold Medal, 1873. A.R.A., 1890. Knighted, 1902. R.A., 1903. His 'Galway Gossips' was bought by the Chantrey Bequest. Later pictures more strictly landscape: 'Green Pastures,' 'Clouds Over the Sea,' 'Warkworth Castle,' 'Banks of the Loing' (diploma work).

Water Measurements. In civil

engineering the unit is the gallon. In estimating rainfall in. are used, these merely expressing the depth attained over the area of rainfall if the surface were level, confined, and impervious. In the U.S.A. the ac.-ft. is the unit for irrigation purposes; this is 43,560 cub. ft., or 271,618 gals. imperial. The U.S.A. gal. = 0.83 imperial gal. It is convenient to measure water by its flow in open channels and pipes. **Open channels.**—A simple formula for mean velocity of flow is $V = \sqrt{2g \cdot m \times \sqrt{r_i}}$, $g = 32.2$ ft. per sec., $r =$ hydraulic mean depth, which is the area of cross-section of water in sq. ft. divided by the wetted perimeter in linear ft.; $i =$ the sine of the angle of inclination of flow; $m =$ a varying factor containing all the modifying factors. The velocity, cross-section, and time being observed, the amount of discharge in a given time is easily determined. Cub. ft. per minute $\times 9000 =$ approximately gals. per day. In taking account of various factors, such as roughness of material used, various empirical formulæ are used. D'Arcy's, a modification of Bazin's, is a simple practical one: $V = r\sqrt{1000i/0.43534}$. Kutter's formula, that most relied on, is very complicated; all must be used in conjunction with an n factor supplied in tables and giving the nature of the surface; it varies from 0.009 for well-planed timber to 0.05 for rough natural water-courses. A discharge 60 per cent. greater than in an ordinary earth channel may be obtained by using a cement surface. In gauging stream velocities, a float such as a bottle may be timed over a given distance, a mean result from several tests being taken; another method is to distribute floats over the surface, determine the mean over a given distance, and multiply by 0.8. From the former central line surface velocity V , the mean cross-sectional velocity may be obtained by multiplying by a factor varying from 0.780 to 0.920; the factor may be obtained from tables. A better form of float is a weighted rod, so devised as to reach within a few in. of the bottom. Current meters are also used; these are practically screw propellers with a recording device to count revolutions, the propeller being composed of conically-shaped cups. By drawing the meter through still water it may be 'rated.' In small streams a dam may be arranged with a pipe, water being collected in a vessel for a certain time and then measured. A measuring vessel is often arranged in a pipe leading from a reservoir; ordinarily the flow is uninterrupted through the vessel, but it may be stopped by a

valve, and the time taken in filling noted. *Measuring weirs* are the usual form of practical measurement. These are carefully constructed and are rectangular, trapezoidal, or V-shaped. In the first type, the opening or notch should not exceed in sectional area one-fifth that of the stream; and the depth of water at the crest should not be less than 5 in.; the discharge is calculated by formula from measurements. As there is a fall in the surface of the water, gauge posts are placed a little up-stream; for accurate work a hook is so arranged that it may be placed, by means of a screw, with its point at the surface of the water; it is attached to a sliding rule from which the height of water from the bottom may be read. The *module* is a form of measuring weir, through which water for irrigation is discharged to a consumer, the amount used being calculated by formula. For a rectangular notch Francis's formula is used: $Q = 3.33 (l - 0.1n) h^{3/2}$; Q being cub. ft. per second flow; l , length of crest in ft.; h , depth of water in ft.; n , a constant. If the crest is the full width of the channel the formula becomes $Q = 3.33 l h^{3/2}$. For the right-angled V notch, $Q = 2.54 h^{3/2}$. Instead of notches, *orifices* are often used; they are generally circular or rectangular, but are only used for small constant discharges. The formula is $Q = 3.9 d^2 \sqrt{v h}$, when h is the 'head' measured from the centre of the orifice; d is the diameter. Yet another method of measuring velocity and thence flow is by means of Pitot tubes; these are tubes bent at right angles, the horizontal arm being held facing up-stream, when the rise of water due to pressure is noted in the vertical arm. *Flow in pipes*.—The formulae are practically the same as for open channels, with modifications for friction. It is important if calculations are to be relied on that the pipes shall be laid correctly so that air cannot accumulate in bends; the alignment should be as straight as possible. The simplest formula is $V = \sqrt{4gh/3}$; it is necessary to note carefully the head of water in this case, as it may be variable, and at a distance away as in reservoirs. Chezy's modification of Kutter's formula is $V = C\sqrt{r}$; this is for clean pipes. If, however, the water is under pressure, it is usual to use *meters*. One of the simplest forms of water-meter is a form of turbine, the rotations being automatically recorded on a dial. They are thoroughly good for large flows, but when pressure diminishes there is a leakage of water passed through the

turbine without producing rotations. If the water is being pumped through the pipe, the discharge can be calculated from the pump. The *Venturi-meter*, invented by C. Herschel, consists of two funnel-shaped sections, of different tapers, forming a constriction in the pipe. The differences of pressure due to friction in passing through the throat of the pipe are measured, the pressure being less at the constriction than at the up-stream end. A device for registering these pressures is arranged and from its records the amount of flow is shown. There is practically no loss of head, as found in other meters. *Positive meters* are the only really reliable form. In these the flow is controlled by a valve which causes the water to pass alternately through two chambers of known dimensions. As soon as one is full the water is turned into the other, the full one supplying the discharge pipe. The number of times these are filled is recorded on a dial. *Valve meters* are simply an arrangement of a valve which opens to different amounts with the varying flow; the amount of opening is recorded by a pencil and drum. From this record the flow may be calculated, but they are generally used as waste-water indicators, to show variations only in flow. See Hennel's *Hydraulic Tables*; Brightmore, *Principles of Waterworks Engineering*; Weisbach and Du Bois, *Hydraulics and Hydraulic Motors*; Hoyt and Grover, *River Discharge*; E. C. Murphy, *Accuracy of Stream Measurements*, U.S. Geol. Survey, Water Supply Paper No. 94, 1904.

Water Melon, or *Citrullus vulgaris*, a plant (ord. Cucurbitaceæ) with yellow flowers followed by large round fruits which are cultivated in tropical countries and sometimes grown in greenhouses in Britain. In the U.S.A. the W.M. is an important crop in the Southern States. The fruit, which has a green rind, often grows to 2 ft. in length, and when ripe the meat inside is a beautiful rosy red and very sweet, particularly when iced. Housewives make a delicious conserve of the rind.

Water on the Brain, see HYDROCEPHALUS.

Water-Ousel, see DIPPER.

Water Plants, see AQUATIC PLANTS.

Water Polo, a water game, generally played in a large swimming bath. The distance between the goals may vary from 19 to 30 yds., the width of the course must not exceed 20 yds., goals must be 10 ft. across and 3 ft. high above the surface in a depth of 5 ft. or more of

water, 8 ft. high from the bottom in shallower water. A large ball, like a football, is used; there are seven players each side and a match lasts fourteen minutes, seven minutes each way. There are many rules, and at least eleven ways of committing a 'foul'. There are many Eng. clubs, and the organised sport is controlled by the Amateur Swimming Association.

Waterproof Composition. In 1835 Mr. Helliwell of Salford patented a method of rendering cotton and other fabrics waterproof on immersion in a solution of rock alum and whitening in water, and afterwards treating with soap and water. Mr. Hall of Doncaster, 1839, used a solution of alum, white lead, and water, sometimes adding acetic acid; the cloth after immersion was passed through lime-water and afterwards through a solution of boiled Irish moss. A composition for tarpaulins, etc., was formed of linseed oil and pipe-clay chiefly, with the addition of white lead, burnt amber, and pumice stone. Macintosh material is made by applying several layers of a benzol or coal naphtha solution of rubber to the fabric, sulphur being added for the purpose of vulcanising by steam heat. The material is then rolled. If stronger fabric is required, two or more pieces of prepared fabric are rolled together so that the rubber faces incorporate. Sulphur is not used with finer fabrics, such as those of wool or cotton; they are exposed to the vapour of sulphur chloride, or dipped in a solution of the chloride in carbon bisulphide, heat not being employed. For coarser and tougher fabrics, paste, glue, and treacle are incorporated together with various pigments. When leather is rendered waterproof in such a manner a layer of varnish is often added as a coat before heating. Linseed oil is used as a basis chiefly in materials which will not be folded, but the substance becomes brittle with age.

Water-Rail, see RAIL.

Water Rights, see RIVERS.—Law relating to Rivers; Riparian Rights. See also TERRITORIAL WATERS; PUBLIC HEALTH; and WATER SUPPLY.

Watershed, Water-parting, or Divide, in physical geography, the whole region which is drained by or contributes to the supply of a riv. or lake. Also the line of separation between the basins of two adjacent rivs., lakes, or drainage-valleys, or the natural boundary of a basin, from which streams flow in opposite directions.

Water-softening. Hardness of water is due to the presence of cal-

cium sulphate, and the bicarbonate of calcium and magnesium (the latter being responsible for temporary hardness which can be removed by boiling), in consequence they do not lather with soap, which is decomposed and insoluble salts of Ca and Mg are formed with the fatty acids. In addition the formation of 'fur' or scale in boilers and kettles by deposition of soluble matters is a great disadvantage. The methods for rendering hard water soft are (1) by the addition of washing soda or of ammonia. In this way calcium carbonate is deposited, $\text{CaSO}_4 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 \downarrow + \text{Na}_2\text{SO}_4$, $\text{Ca}(\text{HCO}_3)_2 + 2\text{NH}_4\text{OH} = (\text{NH}_4)_2\text{CO}_3 + \text{CaCO}_3 \downarrow + 2\text{H}_2\text{O}$. This method is often employed in the household. (2) By the addition of the requisite amount of milk of lime which removes temporary hardness, $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 = 2\text{CaCO}_3 \downarrow + 2\text{H}_2\text{O}$. The precipitate is allowed to settle. This does not remove the sulphate; for this purpose sodium carbonate is added, the Ca being precipitated as carbonate, the sodium sulphate formed being soluble and innocuous. It is usual to supply the lime in defect rather than in excess, though a slight excess is claimed to have bactericidal effect. Commercially the process is carried out in its simplest form by Clark's Process, the whole being managed in tanks from which the clear water is drawn off after settlement of precipitate. In other cases, such as Porter's, filtering is resorted to, and in yet other processes the methods are combined. Sedimentation is also hastened and rendered more complete by allowing the fluid to pass through tanks and pipes with shelves and baffle plates inserted; these are arranged for easy removal and cleaning. The chief point is to diminish the velocity of flow, and to arrange for taking off as far as possible surface water only. (3) The Permutit (base exchange) Process. Water to be softened passes down a tower containing sodium zeolite (hydrated sodium aluminium silicate). Double decomposition takes place between this and the calcium and magnesium salts in solution, resulting in the removal from solution of calcium and magnesium. In time the zeolite becomes ineffective, when it is rejuvenated by running brine over it, when sodium zeolite again forms from the calcium and magnesium compounds precipitated by double decomposition. (4) Recently, trisodium phosphate has been used with success, especially for boiler water softening. Hardness of water is measured in degrees. It is tested by shaking with standard soap solution; or any soap

solution, in which case standard solution of carbonate of lime is similarly agitated and the results compared.

Water-Spaniel, see SPANIEL.

Waterspout. A W. appears as a conical mass with concave sides rising from the water surface to meet by a prolongation of its apex a similar but inverted cone of cloud. The cylindrical joining portion has an unsteady undulatory motion, and the whole W. pursues an irregular path. The conditions for formation appear to be a whirlwind occurring over the sea or a large lake during the prevalence of a humid atmosphere. The rise of heated air is accompanied by rushing wind, which lashes up the water into waves, and the foam and spindrift is carried upwards; it is possible that with the rapid expansion of rising air and the vortex motion very low pressure occurs in the central axis and cold air from above descends; but the mere expansion and expiration of the movement in the upper portion would cause cloud formation. Cloud, in fact, forms most of the system, and a *cloudburst* on land is the counterpart of the W. at sea. Torrents of water, rather than rain, result. Fish and frogs have been carried inland by such phenomena.

Water Supply, in a scientific sense, is a problem connected only with towns, or closely populated regions.

Rural Supply.—In sparsely populated and undeveloped regions, natural sources such as springs or streams are relied on, and purity is sufficiently assured, except when storage is necessary on account of recurring drought. To save portage *wells* have always been and still are in common use. These may be classified as *dipping* and *draw* wells in the majority of cases, and it may be noted that they are the most dangerous, as well as usually containing the hardest water. If the water-table lies at a fair depth from the surface they may be looked upon as stores of filtered water. They are obviously open to pollution from surface water off manured lands and other sources; organic matter, ammonia, nitrates, chlorides, and even nitrites are common impurities. Draw wells may be considered to reach a depth of 20 ft. Both types are to be condemned as drawing their water from surface areas overlying impervious strata. *Deep wells* are those containing water from below such strata. They may be quite satisfactory, particularly if properly enclosed at the surface and drawn by means of a pump. *Artesian wells* form one of the best sources of supply and in the old countries they are becoming much more numerous. Such waters

are obtained from a great distance, usually upland, and below several layers of impervious strata; they are therefore of great purity except when brackish or salt or warm. They are, however, free from organic matter, though the water is often objectionably hard. Artesian wells are extremely variable in cost and supply. Where pipes lead from the pump to tanks, the former should be of cast iron, with spigot and socket ends and joints of yarn and blue lead; tanks are usually of cast or wrought iron and galvanised, but special paint should be applied in addition. The hydraulic ram is largely in use for supplying water from streams and ponds; it is automatic, durable, and extremely economical. The distribution of water in the strata of England may be generalised as follows: The clays, gault, Upper Lias, and New Red Marl are non-water bearing; limited supplies are obtained from Purbeck Beds and Lower Lias; from the gravels, crags, and sands the water is subject to pollution and often contains iron, but good supplies are obtainable from the Reading Beds and Thanet sands. Chalk, Upper and Lower Greensand afford a practically unlimited supply of good, pure, but hard water, which applies also to calcareous grit, oolites, magnesian limestone, and mountain limestone. Good supplies are obtained from Portland rock, Middle Lias, New Red Sandstone, Old Red Sandstone, slate, and granite. Millstone Grit gives excellent water in abundance; the coal measures abundance.

Statutory Powers.—The power to supply water in England and Wales is vested in various bodies, namely, water companies and individuals, acting either under a local Act or a Provisional Order, or under powers given by the general law without the special powers conferred by such Act or Order; local authorities acting as or in default of water companies; joint water boards formed by uniting two or more urban or rural dists. into a united dist. for a common W. S., and private proprietors. If a dist. council wholly or partly within a county makes default in providing an adequate W. S., the Ministry of Health may, after local inquiry, give the council a time limit within which to make such provision or transfer its functions in this respect to the co. council (Local Government Act, 1929). Generally speaking, the W. S. of rural dists. is regulated by the Public Health Act, 1875, and the Public Health (Water) Act, 1878, the supply being under the authority of the rural dist. council as the rural sanitary authority, which has wide

powers, including that of declaring a dwelling-house unfit for habitation if no supply is available. Under the Emergency Powers Act, 1920, Orders in Council may be issued to safeguard the W. S. in time of emergency.

Town Supply.—When the supply required is large and the dist. extensive and uneven larger provision than that of wells is necessary. The water may be taken by means of pumps from a riv. near by, or obtained from a distance, usually an upland surface region. In such cases provision must be made for pressure in order to supply not only the upper stories of houses, but also houses situated on elevated sites. This may be developed by force pumps which supply water to a tower situated above the highest part of the supply pipes. Such a tower maintains a constant 'head' of water and gives pressure if the pumps are intermittently worked; a reservoir may be constructed at such a height for storage and pressure. Such arrangements are becoming less common, reliance being placed entirely on pumping. **Gravitation** may be used for giving pressure when the water is drawn from upland surface regions, storage tanks being arranged in the course of the system at convenient and sufficient heights. In such a system, such as is being adopted steadily by larger industrial areas—*e.g.* Liverpool from Lake Vyrnwy; Manchester from Longderdale valley and Lake Thirlmere; Glasgow from Loch Katrine—water is brought in open aqueducts, tunnels, and pipes from the gathering ground where it is stored in large reservoirs, usually constructed by building a dam across a valley. Along the course compensation water is given out to streams whose head supplies have been tapped. On nearing the tn., a high-level reservoir is generally constructed, from which the water is drawn through the filter beds to the covered clear-water tank which feeds the supply pipes direct. The water may be at great pressure when brought from mountains to the coastal plain, and in low-lying dists. it might necessitate the uneconomical use of stronger pipes. To obviate this a special 'break' reservoir at a convenient height may be fed, which gives its water at less pressure. Subsidiary supplies may also be drawn from other sources near at hand.

Quantities.—The amount of water required is estimated in gallons per head per day; in England it is found to be anything from 20 to 50; in America somewhat more. Waste is due to leakage for the most part. The amount used, of course, varies with

the time of day and with the season. The uses may be summed up as follows: Drinking, sanitation and washing, street and garden watering and fire extinguishing and power, though on account of great expense factories usually install their own supply.

Intakes.—Valve towers are erected in reservoirs and lakes; in the case of rivs., the supply may be brought by a parallel channel from upper reaches to a lateral reservoir; more often tunnels are built in a masonry wall which lead to the reservoir; sometimes a natural or artificial portion of the bank forms a first filter bed, the water being allowed to percolate through. If the head waters are collected at numerous springs, they are usually enclosed and connected by pipes to a reservoir or well whence the water flows into the pipes. When water is pumped from a riv., the times are chosen when the water is at its best.

Conduits, Pipes, etc.—The former are preferably used, unless the volume is too small to justify expense, and they are usually open. Tunnels are used when, for any reason, purity may be endangered. Pipes are resorted to for straighter course, or when the level becomes low and pressure greater, as when a valley is crossed, or when a break in the gradient is advisable.

Purification.—The waters having been collected, they must be freed from impurities both inorganic and organic. For the former sedimentation is relied on chiefly, and when too hard, the process of softening takes place at the same time, the necessary quantity of calcium and sodium carbonate being run in. This is usually carried out in separate reservoirs or beds of shallower proportions, and divided into portions which may be used in rotation. Much organic matter is carried down, and with it bacteria, the process of *filtration* being partly relieved. The filter beds are contained in water-tight tanks with drainage channels leading from gratings in the floor. To prevent clogging, these gratings are covered with heaps of gravel and fine sand laid level over all. Water is run in slowly and percolates through, the organic matter forming a slime on the surface. The sand is simply a mechanical support and collecting area for the impurities, its depth being, as a rule, about 2 ft. The bacteria in these are already at work, and the water being shallow, 2 or 3 ft. above the sand, their activity is greater. It is the layer in which they are active that forms the real filter. As this becomes clogged another bed is brought into use, and the

sand scraped off the surface to be used again after drying and aerating. Filtering is allowed to proceed as slowly as possible, but the rate is contingent on the area available and the demand for water. The reduction in organism in the case of filtering of Thames waters amounts to 97.7 on the average, depending on the thickness of the sand layer and slowness of the process. In America, aluminium sulphate is often added, the effect of which is to aid coagulation of the organic slime, and the water is then forced through the beds at a greatly increased rate, but the resultant water is less free from bacteria. In some cases again the sand bed is given a prolonged life by covering with coarse gravel, in order to lessen also the time of recovery; the filter is no better. From the filter beds the water proceeds to the *clear-water tanks*, from which it is passed into the mains. These are of stone, brick, or concrete, and often covered, when there is danger of contamination from dust, smoke, and fumes of tns. The roof is usually of iron supported on pillars. Ventilation is arranged and the means of cleansing. To prevent heating during the day and in summer, clay foundations are placed under the concrete or brick and round the side, the whole being covered with earth. The size of the service reservoir, as it is called, is adjusted to the varying demand. As in the case of the inlet valve and the reservoirs the outlet pipe of the service reservoir is covered with copper gauze as a strainer.

Distribution.—There is no rule for arranging the diameter of mains and pipes, beyond the one that they have to carry a day's supply practically during 8 to 12 hours of daylight. The water is distributed through a system terminating in the leaden pipes within the houses. Along the course are placed air valves, where air is likely to accumulate owing to bends, scour valves for cleaning purposes, stop valves, reducing valves, the hydrants for use in street-watering and, in case of fire, the waste-water meters, and trade-supply meters. Scouring is performed by opening the scour valves and allowing the water under pressure to waste. The mains and street pipes are laid well below the surface, where they are free from summer heat and winter frost, as well as from damage by heavy traffic. Leakage, however, accounts for some 6 per cent. of the local water supplied. Many large tns. have taken over their W. S. as a trading concern (see MUNICIPAL TRADE). The question of W. S. in many countries is largely connected with IRRIGATION

(q.v.), and the steady development of water-power for producing electrical energy. See also RESERVOIRS, RIVERS, SEWAGE, PUMPS, RAINFALL. In most American cities the W. S. is municipally owned and large sums are often expended to convey the water from distant reservoirs in the mountains. New York City has spent nearly 70 million dollars on two reservoirs in the watershed of the Catskill Mountains, one in the Bronx and one in the Croton watershed. The daily consumption of water in New York City is nearly one billion gallons.

Consult F. E. Turneure and H. L. Russell, *Public Water Supplies*, 1924; A. P. Folwell, *Water-supply Engineering*, 1925; F. M. Parker, *Control of Water*, 1925; W. T. Taylor, *Practical Water Power Engineering*, 1925; W. K. Burton, *Water Supply of Towns*, 4th ed. rev., 1929; J. E. Dumbleton, *The Construction of Wells and Boreholes for Water Supply*, 1928; D. M. Baker and H. Conkling, *Water Supply and Utilisation*, 1930.

Water-tight Compartments, see SHIPS AND SHIPBUILDING.

Watertown: (1) A tn. of Middlesex co., Massachusetts, U.S.A., on Charles R., residential suburb of Boston, 6 m. W. There is a national arsenal; manufs. include rubber, paper, woolen goods, stoves, starch, cardigan jackets, and needles, and horses and cattle are reared. W. was founded about 1630, since when much of its territory has been absorbed by Cambridge. Pop. 34,900. See *Hist. Sketch of Watertown* by Francis (1830), Whitney (1906). (2) City of Dodge and Jefferson cos., Wisconsin, U.S.A., on Rock R., 44 m. W.N.W. of Milwaukee. The N.-western (Lutheran) University (1865) and the Sacred Heart (Rom. Catholic) College (1872) are here. Dairy and apiary supplies, flour, machinery, and bricks are produced. There is good water-power, and boilers, engines and other railroad supplies are manufactured. Pop. (1930) 10,600. (3) Cap. of Codington co., S. Dakota, U.S.A., 100 m. W. by N. of Sioux Falls. It is in a farming dist., has breweries, grain warehouses, lumber interests, and manufs. agricultural implements, cigars, rugs, and brooms. There are poultry and meat packing plants, creameries, foundries, etc. Pop. (1930) 10,300. (4) Cap. of Jefferson co., New York, U.S.A., on Black R., 47 m. from Oswego. It has a state armoury, and manufs. of paper, wood-pulp, steam-engines, vehicles, cheese, and other dairy produce. There are talc and lead mines, and W. is a popular resort. Pop. (1930) 32,100.

Waterville, a tn. of Kennebec co.,

Maine, U.S.A., on the Kennebec, 17 m. N.N.E. of Augusta. Fine water-power is supplied by the Ticonic Falls. Colby Baptist College (Waterville College, 1820) and the Coburn Classical Institute are here. Cottons, woollens, machinery, paper, and furniture are manufactured. There are canoe- and boat-building yards, and poultry and dairy farms in the neighbourhood. Pop. 15,500.

Watervliet, a tn. of Albany co., New York, U.S.A., on Hudson R., opposite Troy. It contains an arsenal covering over 100 acs., the great national gun factory, car works, foundries, etc. Woollens and hardware are among the manufs. It was called West Troy till 1897. Pop. 16,083.

Watford, a par. and market tn. of Hertfordshire, England, on the Colne, 15 m. N.W. of London. Paper-making, brewing, malting, and water-cress cultivation are carried on. Of late years a silk industry has sprung up. It contains almshouses (1873), the London Orphan Asylum (1871), and a library and school of art (1874). Aldenham, 2 m. distant, has an important grammar school (founded 1599). Pop. (1931) 56,800.

Watling Street (*Waeclinga Straet*), one of the old Rom. highways in Britain. It ran from Dover, through Canterbury to London, and then N. past St. Albans (Verulamium) and the boundary between Leicestershire and Warwickshire to Wroxeter on the Severn, and perhaps to Chester. Branch-roads were added later, and it is often confused with the Great North Road to York. The road in London, crossed by Bread Street, with Watling Tavern at the corner of Bow Lane, still bears this name. See J. R. Harris, *Watling Street*, 1928.

Watson, John (1850-1907), an Eng. minister and novelist, known as 'Ian Maclaren.' He was b. at Manningtree in Essex, and became minister of Free St. Matthew's, Glasgow, and of Sefton Park, Liverpool. He was very successful as a writer, and his description of Scottish life delighted the public. His most famous works were: *Beside the Bonnie Brier Bush*, 1894, and *The Days of Auld Lang Syne*, 1895. See *Life* by Robertson Nicoll, 1908.

Watson, Thomas (c. 1557-92), an Eng. lyrical poet, b. in London. He pub. Latin versions of Petrarch's *Sonnets*, of Sophocles' *Antigone*, and of Tasso's *Aminta* before 1585. In 1582 appeared his *Hekatompathia*, or *Passionate Centurie of Love*, a series of eighteen-lined poems, which he called 'sonnets.' His other works include: *Melibeus*, 1590, and *Tears of Fansie*, 1593. See edition of his poems by Edward Arber, 1870.

Watson, Sir William, Eng. poet; b. Aug. 2, 1858, at Burley-in-Wharfedale, Yorkshire; son of a Liverpool merchant who was a native of Yorkshire. His first book, *The Prince's Quest*, appeared 1880; but he did not obtain recognition until 1890, when he pub. *Wordsworth's Grave*. In 1913, there was some surprise when W. was not appointed to the vacant laureateship. The reason for this may have been that W. had repeatedly expressed in verse a deep indignation against the foreign policy of England—though the most fiery lines of *The Purple East* as it first appeared in the *Westminster Gazette* were expunged in the book of that name, 1896; and the pub. works of W. omit his most famous phrase, 'Abdul the Damned.' Knighted 1917. A collected ed. of his poems appeared in 1898 and again in 1905 (2 vols.) Later vols. include: *New Poems*, 1909; *Heralds of the Dawn* (play), 1912; *The Man Who Saw*, 1917; *The Superhuman Antagonists*, 1919; *Poems Brief and New*, 1925; and a *Selection* made by himself, 1928.

Watt, the practical unit of electrical power, and the power obtained when a current of 1 ampere is conveyed through a difference of potential of 1 volt. The number of watts is obtained from the products of the number of volts and amperes operating. Thus $watt = E \times C$. It is equal to 10 ergs per second and 746 watts = 1 horse-power.

Watt, James (1736-1819), a Scottish engineer, b. at Greenock. A delicate child, he made small progress until the age of thirteen, when he entered upon the study of geometry with great interest. He also showed great manual dexterity, and after serving under a London mathematical instrument maker became mathematical instrument maker to Glasgow University in 1757. He was employed on surveys for the Forth and Clyde Canal (1767), as well as for the Caledonian and other canals, and he also had to do with the deepening of various rivs., including the Forth and Clyde, and with the improvement of the harbours of Ayr, Port Glasgow, and Greenock. He had already begun to think about steam as a motive force, and in 1764, while repairing a model of John Newcomen's steam engine, discovered the cause of its waste of power. He, therefore, in 1765 devised the separate condenser to obviate the defect, and in 1769 patented his 'Watt' steam engine, which was manufactured at the Soho Ironworks, W. having entered into partnership with Boulton of Soho near Birmingham. Between 1781 and 1785 he obtained

patents for the sun and planet motion, the expansive principle, the double engine, the parallel motion, and a fuel-saving furnace. He also invented copying-ink and discovered independently the composition of water. *Correspondence* regarding this latter discovery was ed. by J. P. Muirhead, 1846. See *Life of W.* by Muirhead, 1858.

Watteau, Antoine (1684-1721), a Fr. painter, b. at Valenciennes. He went to Paris in 1702, and after enduring much privation he was eventually recognised, being made a member of the Fr. Academy in 1717, and painter to the king in the following year. He died of consumption at Nogent-sur-Marne. Despite his premature death, W. exercised a profound and lasting influence on Fr. art, and left a great number of pictures behind him. Many of them are now in the Louvre, and others are in the Wallace Gallery, while nearly all his work was reproduced in a sumptuous *Recueil*, issued in 1734 by his friend Jean de Julienne. This book is rare, but a good account of W. will be found in *L'Art du 18^{me} Siècle*, by E. and J. de Goncourt (Paris), 1860. See also E. Staley, *Watteau and His School*, 1907.

Watterson, Henry (1840-1921), American journalist; b. Feb. 16, at Washington, D.C.; son of Hon. Harvey Mabee W. Reporter and editorial-writer for Washington states, 1858-61. Served in Civil War on Confederate side: staff-officer; and then chief of scouts. Edited *Republican Banner*, Nashville, Tenn., 1865-68; after that, for fifty years editor of the *Courier-Journal*, Louisville, Ky., retiring 1919. Congressman, 1876-77; declined re-election. Remarkable for his exceedingly long leading articles, in which he frequently castigated his own (Democratic) party. Died at Jacksonville, Fla., Dec. 22.

Wattle, see ACACIA.

Wattmeter, an electrical instrument for measuring electrical power. The power or the rate of doing work in a circuit is equal to the product of the pressure and the current. A good type of this instrument is that due to Siemens. The instrument consists of a fixed coil and a movable coil, each coil having a separate pair of terminals. The movable coil is suspended by a silk thread, and its movements are controlled by a spring which is attached to a torsion head. The fixed coil consists of a few turns of thick wire, while the suspended coil is made up of very fine wire wound on a non-metallic frame. The fixed coil is joined in series with the main current and the suspended coil

is joined in the circuit in which the power is to be measured, and hence is traversed by a current proportional to the pressure. The normal position of the movable coil is at right angles to the plane of the fixed coil. The passage of the current tends to rotate it parallel to the plane of the fixed coil. The amount of this turning is proportional to the number of watts, this amount being read from the graduation marks on the torsion head.

Watts, George Frederick (1817-1904), an Eng. painter and sculptor, b. in London. He studied art in the studio of William Behnes, the sculptor, and also at the Royal Academy schools. In 1843, when several prizes were offered for cartoons to decorate the Houses of Parliament, W. competed and won £300; and, resolving to spend the money on travel, he proceeded to France and Italy. Returning to England in 1847, he became a Royal Academician twenty years later. In 1864 he married Ellen Terry (q.v.). In 1902 he was made a member of the newly instituted Order of Merit, and d. in London. There are pictures from his hand in the Tate Gallery and the National Portrait Gallery, and there is a permanent exhibition at Limnerslease, Surrey; as regards his statuary, his 'Physical Energy' is in Kensington Gardens, and his full-length of Tennyson is at Lincoln. See *George Frederick Watts*, by M. S. Watts, 1912; also books by H. Macmillan, 1903; G. K. Chesterton, 1904.

Watts, Isaac (1674-1748), an Eng. writer of hymns, b. at Southampton. In 1702 he succeeded to the pastorate at Mark Lane Chapel, becoming very eminent as a preacher, but he had to retire in 1712 owing to ill-health. He was the author of 600 hymns, including 'O God, our help in ages past' and 'Jesus shall reign where'er the sun,' besides *Horæ Lyricæ*, religious poems; *Divine Songs*, hymns for children; and a selection of metrical *Psalms of David*. He also compiled educational manuals including *Logic and Scripture History*, and pub. doctrinal treatises of Arian tendency. His collected works (6 vols.) appeared in 1753.

Watts, Sir Philip (1846-1926), British naval architect; b. May 30; son of John W., J.P., of Southsea—another warship expert. Passed Royal School of Naval Architecture, 1870. Entered Admiralty as third-class draughtsman; constructor, 1883. On staff, Chatham Dockyard, 1884. Organised and directed warship-building for Armstrong, Whitworth, & Co., 1885-1902; mainly responsible for Dreadnought type. Director

of Naval Construction, 1902-12. K.C.B., 1905. After 1912, continued to advise Admiralty. Died in London, March 15.

Watts-Dunton, Walter Theodore (1832-1914), an Eng. poet and critic, b. at St. Ives, Huntingdonshire. He was critic of the *Athenæum* (1875-98), and contributed articles on Rossetti and other poets to the *Ency. Brit.* He was a life-long friend of A. C. Swinburne (q.v.). Among his publications are *The Coming of Love*, 1897; *Aylwin*, a poetic romance, 1898; editions of Borrow with introductions; *The Work of Cecil Rhodes*, 1907; *Studies of Shakespeare*, 1910. See T. Hake and A. Compton-Rickett, *The Life and Letters of Theodore Watts-Dunton*, 1916 (2 vols.)

Waugh, Benjamin (1839-1909), an Eng. philanthropist, b. at Settle, Yorkshire. Having studied at Aire-dale College, Bradford, for the Congregational ministry, he became pastor at Newbury (1865), at Greenwich (1866-85), and at New Southgate (1885-87), in which latter year he retired to devote himself to philanthropic work. He was interested in neglected and ill-treated children, and with John Macgregor founded an institution for the care of vagrant boys. In 1870 he was elected to the London School Board for Greenwich, but had to retire in 1876 owing to ill-health. By 1880 he had sufficiently recovered to resume his labours, and founded in 1884, with Miss S. Smith, the London Society for the Prevention of Cruelty to Children. This was incorporated by royal charter in 1895 as the National Society for the Prevention of Cruelty to Children, after which date until 1905 W. acted as director. He pub. *The Children's Sunday Hour*; *W. T. Stead: a Life for the People*; *Hymns for Children*; *The Child of Nazareth*, 1906; *The Gail Cradle: who rocks it?*

Waugh, Edwin (1817-90), the Lancashire poet, b. at Rochdale. Being apprenticed to a bookseller and printer he found opportunities for reading. He learned the literary use that could be made of the Lancashire dialect, and in 1859 won the hearts of his countrymen by his *Lancashire Songs*. He also pub. sketches of Lancashire life and scenery, including *Factory Folk during the Cotton Famine*, *The Chimney Corner*, *Tufts of Heather*, and the *Besom Ben Stories*.

Waukegan, a city, Lake co., Illinois, U.S.A., on the W. shore of Lake Michigan, 36 m. W. by N. of Chicago by rail, is a health resort with valuable mineral springs. It has a good harbour and is a shipping centre. W. manufs. asbestos roofing, steel, wire,

drugs, motors and radio accessories. Pop. (1930) 33,499.

Waukesha, a tn., Waukesha co., Wisconsin, U.S.A., 15 m. W. of Milwaukee, is a popular watering-place with the celebrated Bethesda medicinal springs, the water of which forms a valuable export: there are extensive lime quarries. W. manufs. motors, malted food, church furniture, and dairy products. Pop. 17,176.

Wausau, a city, co. seat of Marathon co., Wisconsin, U.S.A., on the Wisconsin R., is a centre of the lumber trade, and has numerous manufs., including sashes, doors, and blinds, shoes and sandpaper. It has electric power plants, and is a health resort in both summer and winter. Pop. (1930) 23,758.

Wauters, Emile Charles, Belgian painter; b. Nov. 29, 1846, in Brussels. Studied there and in Paris. Travelled in Italy and Germany. Began with historical pictures—'The Madness of Hugo van der Goes' (Brussels), 'Mary of Burgundy before the Magistrates of Ghent' (Liège). Attended opening of Suez Canal; revisited Egypt, 1880. Painted 'Cairo and the Banks of the Nile' (Brussels). Removed to Paris, 1890; painted portraits—Melba and John Astor.

Wave. The ripples on water are the most familiar kind of waves. Investigation shows that an ordinary water-wave consists of a motion which passes along the surface with a definite velocity. The individual particles of the water execute an up-and-down motion solely, and thus give rise to the wave form which is propagated along the surface. Waves differ in many ways, such as their respective lengths, *i.e.* the distance between consecutive crests; their periods, *i.e.* the time an individual particle takes to perform a complete up-and-down motion, and also in their form. The terms *wave-length* and *period* should be thoroughly understood. The *wave-length* has been defined above, but in connection with a wave-motion itself the *period* is defined as the time which the wave takes to move through its own length. To generate waves some disturbance is necessary, also the disturbed medium must have the capacity of restoring itself to its normal state. In the case of water, ripples may be started by dropping a stone into the water; this disturbs the normal state of the water, the capacity for recovery being found in the action of gravity, or in surface tension, or in the two combined. Large waves are affected chiefly by gravity and are called gravitational waves, whereas ripples, or small waves, are due chiefly to

surface tension. The term *wave* has a wider significance than that indicated. From the point of view of the physicist, if the various particles of any material system are executing periodic motions, the resultant motion of the medium is termed a wave-motion. A simple instance is the piston of a steam-engine: it excites a periodic motion in that it travels back and forth in a definite constant time. If this motion is represented graphically it takes the form of a wave, and the motion is treated as a wave-motion. All material substances have some degree of elasticity, and any molecular disturbance which takes place in the body will be propagated through the body in virtue of this elasticity. Elasticity may appear in two different forms, such as the resistance offered to change of bulk and the resistance offered to change of shape. The former is called bulk elasticity or degree of *incompressibility*, and the latter *rigidity*. In gases and most liquids, such as water, the resistance to change of bulk is the only one which exists, and any propagation which takes place through the medium of these fluids is due to this type of elasticity. Such waves are called *longitudinal*, and consist of periodic variations of density in the medium. See also **ÆTHER**; **HEAT**; **ELECTRICITY**; **LIGHT**; **SOUND**; **WIRELESS**.

Waveney, a riv. of England, rises near the Little Ouse and forms part of the boundary between Norfolk and Suffolk. After a course of nearly 50 m. it joins the Yare 4 m. S.W. of Great Yarmouth.

Wavre, a com., Brabant prov., Belgium, 16 m. S.E. of Brussels. The desperate battle fought here (June 18, 1815) between the Prussians and the Fr., under Grouchy, prevented the latter joining Napoleon at Waterloo. Pop. 8100.

Wax, the name given to various animal, vegetable, and mineral substances, which resemble beeswax in having a peculiar lustre. Ws. resemble fats in that they are lighter than water, melt on heating, and burn well. They are soluble in ether and turpentine, but are insoluble in water and cold alcohol, and differ from true fats in that they do not yield glycerine when boiled with alkalis. Beeswax, the most commonly known W., is secreted by bees, and is obtained by heating the 'honeycombs' in water, when the W. rises to the surface. In the crude state this W. is of impure yellow colour, has a melting point of 63° C. and a sp. gr. of 0.96. It contains 12-15 per cent. cerotic acid and some 80-85 per cent. of myricin or myricyl palmitate. For candle-making the W. is bleached in the sun

after treatment with acid. The W. is also used for waxing floors, for making varnishes and lithographic crayons. Chinese W., which is used for candle-making in Japan and China, is produced by an insect (*Coccus ceriferous*), and consists chiefly of ceryl cerotate. Japan W. is obtained from the seeds of a species of *Rhus* (*R. succedanea*). It consists mainly of palmitin, is green when raw, and is bleached in the sun for use in castor oil pomades. Myrtle-berry W. is another vegetable W. made from the plant *Myrica cerifera*. Palm W., or Carnauba W., is produced from the leaves of the W. palm of Brazil (*Corypha cerifera*) and the Andes (*Ceroxylon andicola*). The W. is found on the leaves of the palm, and these are cut and dried in the sun. The W. is then obtained as a fine powder, when the leaves are shaken. Spermaceti (*g.v.*) is a W. obtained from the head of the sperm whale. As an example of a mineral W., ozokerite (*g.v.*) may be mentioned. The most important mineral W. is paraffin W. It is obtained by distillation of petroleum or oil shales, and is largely used for candle-making, as insulating material, in laundries with starch, for waterproofing textiles, and for making pomades and polishes. See **CANDLES**, **SPERMACETI**, **OZOKERITE**, etc.

Waxahachie, co. seat of Ellis co., Texas, U.S.A., 30 m. S.W. of Dallas; has a Methodist College. Pop. (1910) 8042.

Wax-myrtle, see **CANDLEBERRY**.

Wax Palm, see **WAX**.

Waxy Degeneration, see **AMYLOID DISEASE**.

Way, Right of, see **RIGHT OF WAY**.

Waycross, a co. seat of Ware co., Georgia, U.S.A., is the centre of a farming dist., and has saw and planing mills and machine shops, and a large naval store industry. Pop. (1930) 15,510.

Wayland the Smith, a mythical farmer—the *Völund* or *Wieland* of Norse fable—whose name has been handed down by Eng. tradition. He haunted the Vale of White Horse in Berkshire, where some flat stones were long pointed out as his smithy. Scott, by a strange anachronism, introduces him into his *Kenilworth* as a living person in the reign of Elizabeth. *Völund* of Norse myth corresponds to Vulcan or Dædalus of classical mythology.

Wayne, Anthony (1745-96), an American general, called 'Mad Anthony' for his reckless courage, was b. at Easttown, Pennsylvania. He raised a regiment of volunteers (1776), and was sent, as its colonel, to Canada. He was in command at Ticonderoga until 1777; fought at Brandywine, Germantown, Valley

Forge, Monmouth, and Paoli. His most famous exploit was the carrying of Stoney Point (July 15, 1779). He aided Lafayette in Virginia (1781), and took part in the siege of Yorktown. Appointed general-in-chief (1792), he made an advantageous treaty with the Indians (1795).

Waynesboro, a bor. in Franklin co., Pennsylvania, U.S.A., 14 m. S.E. of Chambersburg, manufs. engines and machines, pottery, hosiery, flour, and lumber products, and is the centre of an agricultural region. Pop. (1930) 10,167.

Waynflete, William (1395-1486), a munificent prelate, who took his name from his native tn. of Wainfleet, Lincs, but whose real name was Patten. After being educated at Winchester and Oxford, he was made provost of Eton in 1443; bishop of Winchester, 1447; and Lord Chancellor, 1456. He was the founder of Magdalen College, Oxford, and of a free school in Wainfleet.

Ways and Means, Committee of. At the close of the debate on the Address from the Throne the House of Commons resolves itself into a C. of W. and M., in order to consider the *ways* and *means* of raising the sums required for the ensuing year's estimates, after these have been discussed by the Committee of Supply. The duties of this committee are to authorise grants out of the consolidated fund and to vote the necessary taxes.

Wazirabad, a tn., dist. of Gujranwala, Punjab, India, 60 m. N. by W. of Lahore, manufs. iron and steel goods. The Alexandra railway bridge, one mile distant, spans the Chenab R., and was opened in 1876 by the Prince of Wales. Pop. 17,000.

Waziristan, a tract of land, now forming two political agencies, lying on the border of India between Afghanistan on the N.W., Baluchistan on the S., and the N.W. Frontier Province on the E. It is about 160 m. long from N. to S., and 60 m. from E. to W. The western half is very mountainous and inhospitable. The land slopes eastward, and is, when irrigated, fertile in the N. round Bannu, but too dry to be pastoral further S. The inhabitants are very warlike, and spend much of their time in robbing their more peaceful neighbours. From 1904 to 1919 the important positions were held by militia commanded by British officers. Roads are being built, and the natives are able to earn money, with the result that the raids on other people have been much reduced. Schools are opened at Karamma and Maidan. Area 5700 sq. m. See H. de Watteville, *Waziristan 1919-20*, 1925.

Waziristan Campaign (1919-20). This campaign arose from the disturbances on the Afghan border and came at a time when India was denuded of regular troops. In 1919 the British officers of the Waziristan militias were withdrawn, whereupon these forces deserted and turned against their former leaders. Wazir and Mahsud raiding parties invaded India and penetrated as far as the Punjab, and respect for British authority was waning quickly. It was, therefore, decided to re-impose this respect, but force was not to be resorted to unless all other means failed. The Tochi Wazirs accepted the gov.'s terms. The Mahsuds, however, rejected the terms and operations against them commenced in December 1919. On December 18, General Skeen's force had its first brush with the tribesmen on the Sarkai Ridge. Further actions took place on Mandanna Hill and Tarakai Hill. On December 28, a 'jirga' was held at which the Mahsuds accepted the gov.'s terms, but, later, operations were again resorted to and went on to the middle of February 1920. Further negotiations resulted in a more reasonable attitude on the part of the Mahsuds, who capitulated and gave up many of their rifles. In the autumn operations were begun against the Wana Mahsuds, but these soon agreed to the gov.'s terms, thus bringing the campaign to a close. Generals Skeen, Climo, and Leslie commanded the British columns.

Weald, or Woodland, of Kent and Sussex, Eng., the area lying between the North and South Downs. In this area the two members of the Lower Cretaceous strata, the Wealden and Lower Greensand, are found. The Wealden, which attains a thickness of some 2000 ft., consists of clays, shales, sandstone, and shelly limestones.

Wealdstone, a tn., Middlesex, England, adjoins Harrow-on-the-Hill. Pop. (1921) 13,400, (1931) 27,000.

Wealth may be defined as anything which has an exchange value, and consequently is in itself the basis or subject of the whole science of political economy. W. and money are far from being identical terms; the converse assumption was once, however, acted upon to the extent of placing artificial restraints upon commerce, so as to prevent precious metals from being sent out of the country. As Mrs. Fawcett puts it, our forefathers 'mistook the sign for the thing signified' (see on this CAPITAL, CURRENCY, and MONEY). In the conventional language of political economy, the three requisites of the production of W. are Land, Labour,

and Capital. Labour in the above context necessarily excludes all labour that is not either 'directly' or 'indirectly productive,' i.e. labour which does not increase the collective material W. of the community as opposed to that of a class of persons only. The phrase 'exchange of wealth' implies not only the existence of property, but that that property is owned not by society generally but by individuals and classes. Hence if the institution of private property were ever destroyed the phrase 'exchange of wealth' would have no meaning, as also the various economic laws relative to the distribution of W. among certain classes and persons. W. is divided into rent, wages, and profits, or in other words, is distributed among those who are the proprietors of the previously mentioned agents or requisites of production.

Capital Estimates.—Capital estimates are statements as to the value of a country's capital and their preparation involves a process of calculation possible only by eminent experts, such as Prof. Bowley, Sir Josiah Stamp, Sir Bernard Mallet and Mr. Crammond of the Royal Statistical Society. Such estimates have many uses, the chief of which include (1) tests of progress in the prosperity and resources of different countries; (2) comparison of income with capital and property; (3) comparison of national debt and of the distribution of W. according to individual possessions; and (4) problems arising out of war indemnities. There are various methods of computing W. and they are (i.) based upon data afforded by taxation of income—the method in use in the United Kingdom; (ii.) based upon data from returns of taxation upon capital, a method in vogue in the U.S.A.; (iii.) calculated upon information arising through the collection of death duties, particularly in France and Italy; (iv.) selection of information revealed by the census, as in Australia; and (v.) an inventory of forms of W. from such sources as insurance, etc., a method employed in France and Germany. Estimates vary considerably and may be accepted more accurately as a guide to the extent of national W. rather than any complete statement of it. According to Sir Josiah Stamp in his *Studies in Current Problems in Finance and Government* the 1914 estimates of W. of certain countries are as follows:

	£ million	£ per capita
Great Britain	14,500	318
U.S.A.	42,000	424
Germany	16,550	244

	£ million	£ per capita
France	12,000	303
Russia	12,000	85
Australia	1,530	318
Canada	2,285	300
Japan	2,400	44

In 1923 capital estimates of the following countries were as follow:

Great Britain	£20,000,000,000
Canada	\$25,000,000,000
India	Rs. 15,000 crores
U.S.A.	\$355,000,000,000
France	Fr. 1,200,000,000,000
Italy	L. 611,000,000,000

The 1929 estimate of the capital W. of the U.S.A. is \$408,700 millions.

Distribution of Income.—An interesting comparison of distribution of income is made by Sir Josiah Stamp during the years 1799 (the first year of Income Tax) and 1920:—

Income £	Per cent. of taxed persons	
	1799	1920
200-500	61.5	71.3
500-1000	21.3	16.8
1000-2000	10.3	7.8
2000-5000	5.3	3.7
over 5000	1.4	1.3

It must be borne in mind that these figures give no indication of value of income, since variations in price-levels and the incidence of increased taxation must also be taken into account. In 1929-30 in Great Britain there were 5,100,000 total incomes above taxation exemption limits, and of these 2,850,000 were relieved by abatement, leaving 2,250,000 chargeable with tax. Incomes over £5000 during the year under review numbered 18,559, incomes of £10,000 to £25,000 numbered 7312, while incomes over £25,000 numbered 1851. The distribution of income in the U.S.A. is as follows:

\$	per cent.
1,000- 2,000	33.26
2,000- 3,000	8.15
5,000- 10,000	1.56
10,000- 50,000	.511
50,000-100,000	.037
100,000-200,000	.005
200,000-500,000	.001
1,000,000 and over	.0004

Consult Sir Josiah Stamp, *Wealth and Taxable Capacity, 1922*; *Studies in Current Problems in Finance and Government, 1925*; Pigou, *Economics of Welfare, 1929*; Report of Commissioners of Income Tax, 1931.

Wear, a riv. of England, rises in the Pennine Chain, in the W. of the co.

of Durham, and flowing E. past Durham and Chester-le-Street enters the North Sea at Sunderland. Length, 65 m.

Weasel (*Mustela vulgaris*), a widely distributed carnivore, native of Britain. Its body is about 8 in. long, and its tail 2 to 3 in. Its head is small and flattened, with lively black eyes and short rounded ears. The fur is reddish-brown above and white below. In very cold winters it becomes quite white, except for a reddish tinge of the tail. It feeds principally on rodents and small birds, and hardly deserves its excessive persecution.

Weather, see METEOROLOGY.

Weatherboard: (1) Nautical terms for (a) the side of the vessel which is turned toward the wind; (b) a plank placed in a ship's port to keep out the water while permitting the free circulation of air. (2) Horizontal boards, each overlapping that below, to throw off rain, used as outer covering of walls.

Weatherford, co. seat of Parker co., Texas, U.S.A., 31 m. W. of Fort Worth. Has farming, flour-milling, foundry, and machine-shop industries. There are natural gas and oil wells. Pop. 4912.

Weaver Birds, or *Ploceidae*, a family of passerine birds allied to the finches, so called on account of their remarkable nests, which, in some cases, are immense structures occupied by a colony of birds. They are most numerous in Africa, but extend to Asia and Australia. Most of them are brightly coloured, particularly in the breeding season. The bodies are somewhat elongated and the tails long, and the conical bill is powerful. The nests are constructed of grass, fibres, and twigs, attached together into a mass by a salivary secretion, and are generally suspended at the ends of branches; the entrance is at the bottom or the side. The nests of the social W. B. (*Phylaterus socius*) have a common roof under which as many as 1000 pairs sometimes make their home. Many species are imported to Britain and kept as pets.

Weaving, see COTTON SPINNING AND MANUFACTURE, and WOOL.

Web, see GIRDER.

Webb, Sir Aston (1849-1930). Eng. architect, b. in London, May 22, son of Edward W., an engraver and water-colour painter. Royal Gold Medalist for Architecture (Eng.), 1905; (American) 1907. He designed the general scheme of the Victoria Memorial, in front of Buckingham Palace; also the new buildings of Christ's Hospital at W. Horsham. Among his other works are the

Admiralty Arch at the E. end of the Mall; the Britannia Royal Naval College; the completion of the Victoria and Albert Museum; the Royal College of Science and Technology, S. Kensington, and the offices of the Grand Trunk Railway of Canada, Cockspur Street.

Webb, Matthew (1848-83), 'Captain' W., the Channel swimmer, was b. at Dawley, Shropshire. He was trained for the mercantile marine on the *Conway*, apprenticed in 1862, becoming mate (1866) and captain (1875). He successfully swam the Channel from Dover to Calais without artificial aid in Aug. 1875, covering about 40 m. in twenty-two hours. He was drowned in an attempt to swim the rapids at the foot of the Niagara Falls.

Webb, Philip (1831-1915) (christened Philippe Speakman), Eng. architect, son of Charles W., an Oxford surgeon. Educated at Aynhoe, Northamptonshire, apprenticed in 1849 to John Billing at Reading. Then as assistant in an architect's office at Wolverhampton, and afterwards with George Edmund Street, in whose office (then in Oxford) in 1856 he met William Morris, 'who was henceforward his life-long friend and companion.' Another friend of this time was Edward Burne-Jones. W. R. Lethaby wrote: 'This group of gifted men in an extraordinary way became one-minded, and the earlier work of Webb and Morris was so interwoven that we cannot tell in some instances where the work of one man began and the work of another finished.' In 1856 Street moved his offices to London, and W. came up with him. Ruskin's books and teaching had influenced W. at Oxford; in London they occasionally met. The Red House at Bexley Heath was built in 1859 for Morris. Architects hitherto had been content with copying the outward forms of mediæval work. W. made a new departure, starting not from the forms, but from the spirit and ideas of the old craftsmen and bringing these to bear on problems of his own day. The new wine needed new bottles, and the Red House and its fittings had much to do with the formation of 'the firm'—Morris and Company. The members of the firm were Madox Brown, Rossetti, Morris, Webb, Burne-Jones, Faulkner and Marshall. They had an exhibit in the Great Exhibition of 1861. W. was the designer of animals and birds for textiles, wall-papers and glass, and supervised the stained-glass work. The first furniture made by the firm was under W.'s guidance, and all our better new house furniture owes

something to him—he was responsible for the metal work, glass drinking-vessels and tumblers, and the embroideries. All general designs for decorative schemes were in his hands, and it was said in 1867 that the firm could not move a step without his professional assistance. As an architect W. ranks very high: his buildings were placed by Lethaby 'among the fine achievements of Victorian intellectual effort.' Perhaps his position as an Eng. architect can best be appreciated if we enumerate those who came shortly before him and were of account in his day: Pugin, A. W.; Scott, Sir G.; Butterfield; Pearson; Street; Brooks; and Burges. Amongst all these predecessors there is little trace of those vivifying ideas which were W.'s and from which a living native mode of building soon grew; his work is a living thing whose seed is in itself. But whilst modern brick building was popularised by Norman Shaw and others, W. himself chose to remain almost unknown except amongst a small circle of architects. Those who had the privilege of knowing him well, and especially those who tried to follow his teachings, held him in high veneration and looked on him as one of the greatest Englishmen of his time. W. was one of the founders of the Society for the Protection of Ancient Buildings, and was a constant attendant at its weekly meeting until 1900, when he left London. Amongst his buildings, besides the Red House, are:—Fairmile, Cobham, Surrey; Arisaig, Near Fort William; House, Marlborough Street, Kensington; 1, Palace Green, Kensington; West House, Glebe Place, Chelsea; Church, Brampton, Cumberland; Smeton Manor, Valley of the Swale; House, Welwyn, Herts; additions to Gt. Tangle Manor, Guildford; Business premises, Worship Street, Finsbury; Additions to Washington, Durham; Oakleigh Park, New Barnet; Offices, 19, Lincoln's Inn Fields; Joldwynd, Dorking; Rownton Grange, Northallerton; Clouds, Knoyle, Wiltshire; House, Ewhurst, Surrey. The late W. R. Lethaby (q.v.) contributed to *The Builder* in 1925 a series of twelve articles on W.'s life and work, from which many of the above facts are taken.

Webb, Sidney, *see* PASSFIELD, LORD.
Webb City, a city of Jasper co., Missouri, U.S.A., 160 m. S. of Kansas City by rail, is the centre of a lead and zinc mining dist., and manufs. shoes, clothing, leather goods, and cigars. Pop. (1930) 6876.

Webbe, William (fl. 1568–91), an Eng. critic and author, was educated at St. John's College, Cam-

bridge. He pub. *A Discourse of English Poetrie* (1586) containing much valuable information about contemporary poets, an appreciation of Spenser's verse, a protest against 'tinklerly rhyme,' and some translations in hexameters of Virgil's *Eclogues*.

Weber, Carl Maria von (1786–1826), Ger. composer, was b. at Eutin, in Holstein. His father, who had some reputation as a violinist, influenced his son's choice of a career and, in 1797, put him under the tuition of Michael Haydn, brother of the famous composer, in Salzburg. His first production, six fuguettes, printed by his father, was favourably noticed in the Ger. *Musical Gazette*. Took lessons in singing from Valesi in Munich and in composition from Kalcher, organist of the chapel royal. While still under tuition he composed his first opera, *Die Macht der Liebe und des Weins*. In 1800 was performed Steinberg's opera *Das Waldmädchen*, set to music by W. The next year he composed *Peter Schmall*, but for the next two years was in Vienna to acquire further study. He then became music-director at Breslau, where he wrote *Rübezahl*. Resided for some time in the house of Duke Ludwig of Württemberg at Stuttgart, where he completed his opera *Sylvana*, a remodelling of *Waldmädchen*. In 1822 he brought out in Berlin his greatest opera, *Der Freischütz*, which was first performed in London in 1824 and everywhere made a profound impression. Then followed his *Euryanthe* at Vienna in November 1823. In 1825 he accepted an offer to write an opera for Covent Garden from the libretto of Planché and the result was *Oberon*, founded on Wieland's well-known poem. W. himself conducted the opera at Covent Garden, but during his visit to London he d. of consumption on June 5.

Weber, Ernst Heinrich (1795–1878), Ger. physiologist, anatomist, and psychologist; b. June 24, in Wittenberg; son of Michael W., theologian. Studied medicine at Wittenberg and Leipzig. At Leipzig, prof. of: comparative anatomy, 1818; human anatomy, 1821; from 1840 human anatomy and physiology. In 1834 he proposed what is now known in psychology as Weber's Law, thus stated by J. M. Baldwin: 'The least added difference of stimulus that can be noticed is a constant proportional part of the original stimulus; thus, if one pound when lifted can just be discriminated from one pound and one ounce, ten pounds cannot be discriminated from ten pounds and one ounce, but the difference needs to be

ten ounces.' Fechner verified this principle, and was the first to call it Weber's Law. It is approximately true for hearing, sight, pressure, and muscular sense: it seems inapplicable to taste and smell, or nearly so. The phenomena are taken to indicate a lag somewhere between stimulus and apperception; and differences of opinion as to where this lag occurs have given rise to three theoretical interpretations of the law: (1) *Psycho-physical*: lag between stimulus and excitation; (2) *Physiological*: lag between excitation and sensation; (3) *Psychological*: lag between sensation and apperception. The psychological, in one form or another, is the usual interpretation. W. also discovered the existence of a rudimentary uterus in male mammals. Works include: *Anatomia Comparata Nervi Sympathici*, 1817; *De Aure et Auditui Hominis et Animalium*, 1820; *Tractatus de Motu Iridis*, 1821; *Wellenlehre* (with his brother Wilhelm), 1825; *Zusätze zur Lehre vom Baue und den Verrichtungen der Geschlechtsorgane*, 1846; *Die Lehre von Tastsinn und Gemeingefühl*, 1851; *Annotationes Anatomicae et Physiologicae*, 1851. Died in Leipzig, Jan. 26. See Karl Friedrich Wilhelm Ludwig's *Rede zum Gedächtniss an E. H. Weber*, 1878.

Weber, Wilhelm Eduard (1804-91), a Ger. physicist, was b. at Wittenberg. He carried on researches in magnetism, acoustics, and electro-dynamics, and in collaboration with his brother he pub. *Die Wellenlehre auf Experimente Gegründet*, 1825.

Webster: (1) A tn. of Worcester co., Massachusetts, U.S.A., 16 m. S. by W. of Worcester, on French R.; has iron and brass foundries, and manufs. cotton and woollen goods. Pop. (1930) 12,992. (2) A city of Hamilton co., Iowa, U.S.A., 62 m. N. by W. of Des Moines; coal, limestone and brick-clay are worked, and foundry products manufactured. W. has a horse and mule market, chicken hatcheries, and creameries. Pop. (1930) 7024.

Webster, Daniel (1782-1852), a celebrated American orator, statesman, and jurist. Began practising at the Bar in 1805, at Portsmouth, New Hampshire, and very soon leapt to the front of his profession. Was elected to Congress, 1813, and sat there till 1817, still practising at Boston, where he had purchased an estate. Entered Congress for the second time in 1822; elected to the Senate in 1828, and eight years later unsuccessfully ran for the presidency. In politics he first used his powerful oratorical gifts on the side of Free Trade, but afterwards espoused the system of Clay (see **TARIFF**). He

was appointed Secretary of State under W. H. Harrison, and while holding that office negotiated the celebrated Treaty with Lord Ashburton which settled the boundary of Maine. W. became the hero of the North in 1830 by his speech in reply to Senator Hayne. The slavery question and the threat of secession had already come up. W.'s speech, with its peroration, 'Liberty and Union, now and forever, one and inseparable,' is treasured in American annals. But he injured his fame in a speech on March 7, 1850, in which he denounced the Northern Abolition Societies. He resigned office in 1843, and again sat in the Senate, 1845. In 1850 he again filled the office of Secretary of State, retaining the post till his death. Was one of the greatest American orators of all time, though he did not always employ his gifts on the side of morality, especially when he refused to support the abolition of slavery on the ground that the Union would be endangered. See *Life* by Curtis (1869) and H. C. Lodge (1891).

Webster, John (c. 1580-c. 1625), an Eng. dramatist, the son of a tailor, was apprenticed to the same craft, and in 1603 was made a freeman of the Merchant Tailors' Company. From his pen came historical plays, comedies, and pageants. The first play written entirely by himself, and pub. in 1612, was a tragedy entitled *The White Devil*, which was shortly followed by *Appius and Virginia*. His masterpiece was *The Duchess of Malfi*, first performed by the King's Men at Blackfriars in 1616, and frequently revived. See *Works*, ed. Dyce, 4 vols. 1830; *Dramatic Works*, ed. Hazlitt, 4 vols. 1856; *Complete Works*, ed. F. L. Lucas, 4 vols. 1927. See also R. Brooke, *John Webster and the Elizabethan Drama*, 1913.

Webster, Noah (1758-1843), an American lexicographer, b. at W. Hartford, Connecticut. He began life as a schoolmaster and pub. *A Grammatical Institute of the English Language* (1783-85), which had an enormous sale. He then began preparing his famous *Dictionary*, which appeared in 1828. W. became editor of the *Minerva* (1793) and the *Herald* and wrote *A Brief History of Epideemics* (1799), *A Philosophical and Practical English Grammar* (1807). See H. E. Scudder, *Noah Webster*, 1882.

Webster, Sir Richard Everard, see **ALVERSTONE, LORD**.

Wedderburn, Alexander, first Baron Loughborough, and first Earl of Rosslyn (1733-1805), a distinguished lawyer and statesman, b. at Edinburgh. He was called to the Bar,

1754, but left Scotland and came to London, where he became a member of the Inner Temple, 1757. He at first attacked Lord North, but was afterwards made Solicitor-General by him. In 1778 he became Attorney-General, and 1780-83 Lord Chief Justice of Common Pleas.

Wedding Ceremonies, see MARRIAGE AND MARRIAGE LAW.

Wedekind, Frank (1864-1918), Ger. playwright; b. July 24, at Hanover; son of a physician. Mother an actress. Studied law, Munich and Zürich. On staff of *Simplicissimus*, Munich; produced plays in Leipzig. Served term for *lese-majesté*. On stage in Berlin. Returned to Munich, 1906. Works include: *Frühlings Erwachen*, 1891 (Eng. trans. *The Awakening of Spring*, Philadelphia, 1909); *Die Buchse der Pandora*, 1904; *Der Marquis von Keith*, 1904; *Totentanz*, 1906; *Mit allen Hunden gehetzt*, 1910; *Franziska*, 1912; *Leidenschaften*, 1913; *Bismarck*, 1916. See also *Tragedies of Sex* in Eng. trans. 1923.

Wedgwood, Josiah (1730-95), an Eng. manufacturer of pottery called after his name, b. at Burslem in Staffordshire. He worked in his brother's pottery until in 1759 he established his own manufactory, where he produced a cream-coloured porcelain, patented by him in 1763. He executed a table-service for Queen Charlotte (whence its name, Queen's ware) and another for the Czarina of Russia. From 1775 he employed Flaxman, the sculptor, to execute designs and studied to create only the most beautiful and delicate ware. He made some exquisite copies of classical vases, notably of the Portland vase. He pub. pamphlets on his art, and his catalogues were translated into many European languages. See *Life* by E. Meteyard, 1865-66; by A. H. Church, 1894; also W. Burton, *Josiah Wedgwood and his Pottery*, 1922.

Wedmore, a vil., Somersetshire, Eng. It is noted for the treaty (sometimes called the Treaty of Chippenham) concluded here (878) between King Alfred and Guthrum the Dane, by which the country N. of Watling Street was ceded to the Danes.

Wedsbury, a mun. and parl. bor., Staffordshire, England. There are extensive manufs. of iron (boiler plates, bar iron, axles, tools, gunlocks) and steel. Coal, iron, and limestone are worked in the neighbourhood. Pop. (1931) 31,500.

Wednesday (A.-S. *Wodnesdæg*, Woden's Day), the fourth day of the week. It was the *Dies Mercurii* of the Romans, whom the Fr. follow in calling it *Mercredi* (Mercury's Day). It is regarded by the Persians as a

'red-letter day,' because the moon was created on the fourth day.

Weeds. The fight with W. may begin when the ground is dug in winter; perennial W. such as couch, dandelion, bindweed, daisy, plantain, shepherd's purse, thistle, coltsfoot, and horsetail may then be picked out, thrown into a heap, and burned. As fast as annual W. show in spring they should be hoed up into the sun; this should be continued through the summer. The last crop of annual W., which has no time to seed, may be dug in as green manure. See W. E. Brenchley, *Weeds on Farm Land*, 1920; R. Morse and R. Palmer, *British Weeds*, 1925.

Weehawken, a township, Hudson co., New Jersey, U.S.A., on the Hudson R., 2 m. N.N.E. of Hoboken and connected with New York City by ferry; is a residential suburb of the latter. Pop. 14,807.

Week (A.-S. *wicu*), a period of seven successive days, as in Jewish and Christian calendars, especially such a period beginning with Sunday and including in addition to that day Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday. The W. has been in use in Eastern countries from the earliest times, but was not introduced into the Rom. calendar till after the reign of Theodosius (fourth century A.D.). The names of the days of the W. are derived from the planets, the hours being allotted to the seven planets in the order of their supposed distances from the earth, and each planet being regarded as presiding over the day whose first hour belonged to it. Thus the days of the Rom. W. were assigned in order to the Sun, the Moon, Mars, Mercury, Jupiter, Venus, and Saturn. The Latin nations have retained the names derived from these deities, but in the Germanic languages they are replaced by names derived from those of the corresponding Germanic deities, Tyr being regarded as the equivalent of Mars, Woden of Mercury, Thor of Jupiter, and Freya of Venus.

Weem, see EARTH-HOUSE.

Weeping, an involuntary expression of anguish or of pain. Its chief characteristics are sobbing and shedding of tears. Among primitive or emotional races the weeper often knocks his breast, tears his hair, and cries out with a loud voice. W. may also be a sign of great joy and of uncontrollable laughter. Excessive W., alternating with helpless laughter, is one of the signs of hysteria.

Weevils, Plant-eating Beetles, or *Curculionida*, a very large family of beetles of the group Rhynchophora of the order Coleoptera. They are characterised by the possession of a

distinct beak or snout which is sometimes very long. The larvæ are white, fleshy grubs with wrinkled skin and bent bodies, and usually have no legs. These and the beetles of many species cause great damage to cultivated plants, while many cause much loss by their destruction of grain. The large brown pine W. (*Hyllobius abietis*) is a serious pest of forest trees, often destroying acs. of young conifers, most of the damage being done by the adults, though in most species it is the grubs which are more mischievous. Garden Ws. feed at night and seek shelter during the day, and can be caught by laying sacks on the ground.

Weigall, Arthur Edward Pearse Brome, Eng. Egyptologist and author; b. Nov. 20, 1880; son of Major A. A. D. Weigall. Educated: Hillside School, Malvern; Wellington College; New College, Oxford. Assisted Professor Flinders Petrie. Inspector-general of Antiquities to Egyptian Gov., 1905-14. Works include: *Report on the Antiquities of Lower Nubia*, 1907; *Guide to the Antiquities of Upper Egypt*, 1910; *Life of Akhnaton*, 1910 (rev. 1922); *Life of Cleopatra*, 1914 (rev. 1924); *Tutankhamen and Other Essays*, 1923; *A History of the Pharaohs*, vol. i., 1925, vol. ii., 1926; *Nero*, 1930; some books on British archaeology; and some novels.

Weighing Machines. The earliest form of W. M. was the balance (*q.v.*), which is a lever resting on a fulcrum placed exactly half-way between the

weights are of necessity much smaller than the object to be weighed. Such machines consist essentially of a lever in which the fulcrum is much nearer to the load than the balancing weights. The classical examples of such machines are the Rom. and Danish steelyards, while the platform balance for weighing luggage and the weighbridge for weighing coal, etc., are modern types of this class of machine. The figure shows the working of the Avery W. M. that is seen on all railway platforms. The person to be weighed stands on a platform and in consequence the bar *PQ* is pulled downwards and the lever *CFQ* that is balanced on the fulcrum at *F* rotates in a clockwise direction. This stretches the resistance spring and the lever *AB* rotates about the fulcrum *T* in an anti-clockwise direction. In this way the rack that is engaged with the pinion causes the pointer to rotate and indicate the person's weight. The slot *S* prevents the lever *CFQ* oscillating and consequently the pointer quickly comes to rest. *A* is a weight that serves as a counterpoise to the rack. The diagram shows the rear view of the principal parts only of the instrument. See G. A. Owen, *Weighing Machines*, 2nd ed., rev. 1928.

Weights and Measures. In order to measure any quantity of length, time, mass, etc., it is necessary first of all to fix on a definite quantity of the same kind and call this the unit of measurement. The unit selected, any other quantity will be measured by the number of units it contains. The concrete representation of a unit is termed the 'standard.' In the Eng., or foot-pound-second system, the unit of length is the foot, a foot being one-third of a yard. The yard is defined as the distance between two plugs of gold sunk in a bar of platinum which is kept in the Exchequer offices, London, at a temperature of 62° F. This is the standard yard. This standard is not big enough for all purposes, and so the mile (= 1760 yds.) is used for the measurement of greater lengths. Similarly, for some purposes it is not small enough, and hence the yard is further subdivided to feet and inches. The Eng. system, or F.P.S. system, has for units of length, mass, and time, the foot, pound, and second. The foot is defined above. The unit of time, the mean solar second, is derived from the average length of the solar day. The unit of mass, the pound avoirdupois, is the mass of a piece of platinum preserved in the Exchequer offices. Eng. commercial measures are arranged at 62° F. in air, the barometer being 30 in. at mean sea-level.

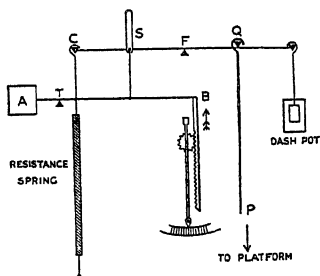


DIAGRAM OF THE AVERY
WEIGHING MACHINE

two pans. The lever has therefore two equal arms and the weights placed in one pan are exactly equal to the weight of the object in the other pan when the beam of the balance is in equilibrium. In the majority of W. M. the balancing

BRITISH SYSTEMS
MONEY

4 farthings (f)	= 1 penny (d.).
12 pence	= 1 shilling (s.).
20 shillings	= 1 pound (£), or 1 sovereign.

Standard gold coin is 22 carats, *i.e.* is an alloy of 22 parts gold to 2 parts of copper. Silver coins are also of alloy, being made of 222 parts silver to 18 of copper. 'Copper' money is made of bronze (95 copper, 4 tin, and 1 of zinc), the halfpenny being 1 in. in diameter, and three pennies and five half-pennies weighing the same, viz. 1 oz. avoirdupois.

LENGTH (LONG MEASURE)

12 inches (in.)	= 1 foot (ft.).
3 feet	= 1 yard (yd.).
5½ yards	= 1 rod, pole, or perch.
40 poles (220 yds.)	= 1 furlong (furl.).
8 furlongs (1760 yds.)	= 1 mile (m.).
3 miles	= 1 league.

Additional measures of length are :

1 chain	= 100 links = 22 yds.
10 chains	= 1 furlong.

(Used in land surveying)

6 feet	= 1 fathom.
100 fathoms	= 1 cable's length.

(For recording depth of soundings)

6080 ft.	= 1 knot.
1870 yards	= 1 nautical mile.

(For measuring rate of sailing)

4 inches	= 1 hand.
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(Used in measuring horses)

AREA (SQUARE MEASURE)

144 square inches	= 1 square foot
9 square feet	= 1 square yard.
30½ square yards	= 1 square pole.
40 square poles	= 1 rood.
4 roods	= 1 acre (4840 sq. yds.).

640 acres	= 1 square mile.
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Since 22 yds. = 1 chain, then 484 sq. yds. = 1 sq. chain. Thus a square chain is $\frac{1}{16}$ part of an acre, or 6400 square chains are contained in a square mile.

MEASURES OF VOLUME AND CAPACITY

Cubic Measure

1728 cubic inches	= 1 cubic foot.
27 cubic feet	= 1 cubic yard.

Cubic measure is used for measuring the volume of solids, such as stone, brickwork, and wood.

A marine ton	= 40 cubic feet.
1 stack	= 108 cubic feet.
1 cord	= 128 cubic feet.

For solids such as corn, sand, etc., measures of capacity may be used.

Measure of Capacity (Liquid or 'Dry' Measure)

4 gills	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.
2 gallons	= 1 peck.
4 pecks	= 1 bushel.
8 bushels	= 1 quarter.
5 quarters	= 1 load.
2 loads	= 1 last.

One gallon of water weighs 10 lb. avoirdupois and contains 277.463 cub. in. In U.S.A. the gallon contains only 231 cub. in., and the other measures are proportionately smaller. The pint of 'liquid measure' is also only about $\frac{2}{3}$ of the pint of 'dry measure.'

Wine Measure

2 pints	= 1 quart.
4 quarts	= 1 gallon.
10 gallons	= 1 anker.
42 gallons	= 1 tierce.
2 tierces	= 1 puncheon.
1½ puncheons	= 1 pipe or butt.
2 pipes	= 1 tun.

Ale and Beer Measure

4 gills	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.
9 gallons	= 1 firkin.
2 firkins	= 1 kilderkin.
2 kilderkins	= 1 barrel.
1½ barrels	= 1 hogshead.
1½ hogsheads	= 1 puncheon.
1½ puncheons	= 1 butt or pipe.

Imported wines have varying sizes for the casks, but always 2 hogsheads = 1 pipe or butt, and 2 pipes or butts = 1 tun. A hogshead of claret = 46 gals.; 1 pipe of Madeira or Cape Pontac = 92 gals.; 1 pipe of Marsala = 93 gals.; 1 pipe of port = 115 gals.; 1 pipe of Lisbon = 117 gals.; 1 butt of sherry = 108 gals.; 1 aum of Hock or Moselle = 30 gals.

WEIGHTS

1. *Avoirdupois Weight*

16 drams	= 1 ounce.
16 ounces	= 1 pound.
14 pounds	= 1 stone.
2 stones (28 lb.)	= 1 quarter.
4 quarters	= 1 hundred-weight (cwt.).
20 cwt.	= 1 ton.

In the U.S.A. and Canada the current quarter is 25 lb. and the ton 2000 lb. except for a few commodities, such as bituminous coal and imported goods. By the Weights and Measures Act, 1878, it was enacted that gold, silver, platinum, and precious stones might be sold by troy weight, and drugs might be sold by apothecaries' weight.

2. Troy Weight

24 grains = 1 pennyweight (dwt.).
 20 pennyweights = 1 ounce (oz. troy).
 12 ounces troy = 1 pound (troy).
 1 lb. troy = 5760 grains, and 1 lb. avoirdupois = 7000 grains (troy).

3. Apothecaries' Weight

20 grains or minims = 1 scruple.
 3 scruples = 1 drachm.
 8 drachms = 1 ounce.
 12 ounces = 1 pound.

From this table 1 ounce = 480 grains. In 1885 the British Pharmacopoeia modified apothecaries' weight by ceasing to recognise the ounce of 480 grains, employing in its place the ounce (avoirdupois) of 437½ grains. Thus apothecaries' weight became:

437½ grains = 1 ounce.
 16 ounces = 1 pound.

4. Apothecaries' Fluid Measure

60 minims = 1 fluid drachm.
 8 drachms = 1 fluid ounce.
 20 ounces = 1 pint (pt. or O).
 8 pints = 1 gallon (gal., C., or Cong.).

For rough approximation, one half-wineglassful = 2 tablespoonfuls = 4 dessert-spoonfuls = 8 teaspoonfuls = 8 fluid drachms = 1 fluid ounce.

5. Diamond and Pearl Weight

3½ grains (av.) = 1 carat.
 or 4 pearl grains = 1 carat.
 151½ carats = 1 ounce (troy).

The pearl grain is smaller than the grain troy, 5 pearl grains being equal to 4 troy grains, and 600 to the troy ounce. By the Weights and Measures Act of 1897 metric weights may be used in the United Kingdom for all purposes—then 1 troy grain = 65 milligrammes, 1 pearl grain = 52 milligrammes, and 1 carat = 205 milligrammes.

MEASURES OF TIME

60 seconds = 1 minute.
 60 minutes = 1 hour.
 24 hours = 1 day.
 7 days = 1 week.
 365 days = 1 year.
 366 days = 1 leap year.
 100 years = 1 century.

The solar day is the interval between two successive passages of the sun over the meridian of a certain place. This interval varies in length since (1) the earth's orbit is an ellipse and not a circle; (2) the sun is not in the centre of the ellipse, but in one of the

foci; and (3) the sun's path does not travel due E. and W. During the solar day the earth revolves on its axis nearly one degree ($\frac{360}{365.25}$) more than 360°, owing to the amount of its movement in its revolution round the sun. The sidereal day is the interval between two passages of a star over the same meridian. This interval requires the earth to revolve exactly 360° on its axis; and the period must necessarily be of invariable length, and there must be one more day in a sidereal year than in a solar year. The length of the sidereal day = 23 hrs. 56 min. 4 sec. of a common or civil day.

ANGLE MEASURE.—The magnitude of an angle is generally expressed in circular measure for scientific purposes. The unit of circular measure, the radian = the angle subtended at the centre of a circle by an arc equal to the radius. To convert degrees to radians the following formula is employed: $\frac{\theta}{360^\circ} = \frac{\theta^r}{2\pi}$ where θ = the angle in radians, θ^r = the angle in degrees, and $\pi = 3.1416$.

60 seconds (") = 1 minute (').
 60 minutes = 1 degree (°).
 90 degrees = 1 right angle.

PAPER MEASURE

24 sheets = 1 quire.
 20 quires = 1 ream.
 2 reams = 1 bundle.
 10 reams = 1 bale.

PHYSICAL MEASUREMENTS.—These are made both by using the units of the British or F.P.S. system, or by the use of the C.G.S. system. In the latter the units of length, mass, and time used are the centimetre, gramme, and second. These are fundamental units from which various absolute units are derived (see UNITS).

(For the metric system see article on METRIC SYSTEM.)

WEIGHTS AND MEASURES OF FOREIGN COUNTRIES

The U.S.A. and Canada use the British weights and measures with one or two minor differences, e.g. they have two tons, the *short ton* of 2000 lb. and the *long ton* of 2240 lb. Australia, New Zealand, Irish Free State, and Newfoundland adopt the British system in its entirety. The *metric system* is adopted in all other European countries, including Russia (since Jan. 1, 1927), and in Japan (since July 1, 1924), and the Central American states, Chile, Brazil, Mexico, Peru, etc., etc. This system was made permissive in the United Kingdom in

1897, but there is very little prospect of its adoption, although it is the universal system of scientists. British India and Burma use the following system of weights and measures: 1 chittak = 2.06 oz.; 1 seer = 16 chittak; 1 maund = 40 seers (in Madras 8 vis = 1 maund; 20 maunds = 1 caudy = 500 lb.; in Bombay the seer and maund are about one-third of the

Bengal seer and maund respectively); 1 ungul = $\frac{1}{4}$ in.; 1 guz = 33 in.; 1 koss = 2000 yds. There is, however, much confusion between the various units adopted in different localities. In China, 1 catty = $1\frac{1}{2}$ lb.; 1 picul = 1 cwt. 21 $\frac{1}{2}$ lb. (100 catties), while Greece still retains the following, 1 ocque = 2.84 lb.; 1 quintal = 132.2 lb.

TABLE OF FOREIGN MONIES.

Note.—The following table gives the values of foreign monies at the parity of exchange previous to the economic crisis that brought about the suspension of the Gold Standard in the United Kingdom on Sept. 21, 1931.

Country.	Monetary Unit.	Value in British Money (to nearest $\frac{1}{10}$ d.).	Coins.
Argentina	<i>Peso</i> (100 <i>centavos</i>)	£ s. d. 0 1 8.8	Paper currency.
Austria	<i>Schilling</i>	0 0 6.9	100, 25, 2, 1, $\frac{1}{2}$ schillings.
Belgium	<i>Belga</i> (5 <i>francs</i>)	0 0 6.9	1 belga; 20, 2, 1, $\frac{1}{2}$ francs.
Brazil	<i>Milreïs</i>	0 0 5.9	500 reis; paper currency.
Bulgaria	<i>Lev</i>	0 0 0.4	100, 50, 10 leva.
Chile	<i>Peso</i> (100 <i>centavos</i>)	0 0 6	100, 50, 20, 5, 2, 1 pesos.
China	<i>Dollar</i> (100 <i>cents</i>)	0 1 6	1 dollar; 50, 20, 10, 5 cents.
Czechoslovakia	<i>Krone</i>	0 0 1.5	Paper currency.
Denmark	<i>Krone</i> (100 <i>öre</i>)	0 1 1.3	20, 10, 2, 1 kroner; 25, 10 öre.
Egypt	<i>Pound</i> (100 <i>piastres</i>)	1 0 6.3	1 pound; 50, 20, 10, 5, 2 piastres.
Finland	<i>Markka</i> (100 <i>penni</i>)	0 0 1.2	200, 100, 1 markka; 50, 25 penni.
France	<i>Franc</i> (100 <i>centimes</i>)	0 0 1.9	20, 10, 5, 2, 1 francs; 50, 20 centimes.
Germany	<i>Reichsmark</i> (100 <i>pfennige</i>)	0 0 11.7	20, 10, 5, 3, 2, 1 marks; 50 pfennige.
Greece	<i>Drachma</i> (100 <i>lepta</i>)	0 0 0.6	20, 10, 5, 1 drachmas; 50, 20 lepta.
Holland	<i>Florin</i> (100 <i>cents</i>)	0 1 7.8	10, 5, 2 $\frac{1}{2}$, 1, $\frac{1}{2}$ florins; 25, 10 cents.
Italy	<i>Paper lira</i>	0 0 2.6	Paper currency.
Japan	<i>Yen</i> (100 <i>sen</i>)	0 2 0.6	20, 10, 5 yen; 50, 20, 10 sen.
Mexico	<i>Peso</i> (100 <i>centavos</i>)	0 2 0.5	20, 10, 5, 2.5, 2, 1 pesos; 50, 20, 10 centavos.
Norway	<i>Krone</i> (100 <i>öre</i>)	0 1 1.5	20, 10, 5, 2, 1, kroner; 50, 25, 10 öre.
Persia	<i>Pahlavi</i> (20 <i>riyals</i>)	1 0 0	1, $\frac{1}{2}$ pahlavi; 5, 2, 1, $\frac{1}{2}$ riyals; 20, 10, 5, 2, 1 dinars ($\frac{1}{10}$ riyal).
Peru	<i>Sol</i> (100 <i>dineros</i>)	0 1 7.8	1, $\frac{1}{2}$, $\frac{1}{4}$ soles; 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ dineros.
Portugal	<i>Escudo</i> (100 <i>centavos</i>)	0 0 2.3	Paper currency.
Rumania	<i>Leu</i> (100 <i>bani</i>)	0 0 0.3	100, 50, 25, 20, 5, 2, 1 lei; 50 bani.
Russia	<i>Rouble</i> (100 <i>kopecks</i>)	0 2 1.3	1 rouble, 50 kopecks.
Spain	<i>Peseta</i> (100 <i>centimos</i>)	0 0 9.5	5, 2, 1 pesetas; 50, 20 centimos.
Sweden	<i>Krona</i> (100 <i>öre</i>)	0 1 1.5	20, 10, 5, 2, 1 kronor; 50, 25, 10 öre.
Switzerland	<i>Franc</i> (100 <i>centimes</i>)	0 0 9.5	20, 10, 5, 2, 1 francs; 50 centimes.
Turkey	<i>Lira</i> (100 <i>piastres</i>)	0 18 0	500, 250, 100, 50, 25, 20, 10, 5, 2, 1, $\frac{1}{2}$ piastres.
U.S.A.	<i>Dollar</i> (100 <i>cents</i>)	0 4 1.3	20, 10, 5, 2 $\frac{1}{2}$, 1, $\frac{1}{2}$, $\frac{1}{4}$ dollars; 1 dime.
Uruguay	<i>Peso</i> (100 <i>centesimos</i>)	0 4 3	10, 1 pesos; 50, 20, 10 centesimos.
Yugoslavia	<i>Dinar</i> (100 <i>paras</i>)	0 0 9.5	20, 10, 5, 2, 1 dinars; 50 paras.

BRITISH DOMINIONS.

Dominion.	Monetary Unit.	Value in British Money (to nearest $\frac{1}{10}$ d.).	Coins.
Australia	<i>Pound sterling</i>	£ s. d. 1 0 0	Special florins, shillings, etc.
Canada	<i>Dollar (100 cents)</i>	0 4 1.3	1 dollar; 50, 25, 10, 5 cents.
India	<i>Rupee (16 annas)</i>	0 1 6	15, $\frac{1}{2}$ rupees; 4, 2, 1 annas.
Irish Free State	<i>Saorstát (pound)</i>	1 0 0	Special florins, shillings, etc.
New Zealand	<i>Pound sterling</i>	1 0 0	British.

LAWS OF WEIGHTS AND MEASURES.

—The Act of 1878 was the principal Act, amendments being made by the Acts of 1889, 1892, 1897, 1904, and 1926. Section 1 of the Act of 1897 declares legal the use of metric weights and measures for all purposes. Every W. and M. must have its denomination stamped on the top or sides in legible figures and letters, and every measure of length (Weights and Measures Act, 1904) or capacity must have the denomination stamped outside it. Inspectors are appointed by local authorities to inspect weights and measures, but an inspector may not act unless and until he has passed an examination and obtained a certificate of qualification (for the fees for verification and stamping W. and M., see Order in Council, April 26, 1920, Fees (Increase) Act, 1923, and the Weights and Measures Act, 1926). The Board of Trade, among other statutory powers respecting W. and M., has powers over instruments for measuring gas (Gas Regulation Act, 1920). The Bread Act of 1836 made bread saleable only by weight, except in the case of Fr. and fancy bread or rolls; but under the amending Act of 1926 bread may not be sold otherwise than by net weight (though selling without weighing at the time of sale is not made an offence). Under the Corn Sales Act, 1921, the Corn Returns Act, 1882, is amended and provision is made for the sale of cereals by weight in terms of the hundredweight of 112 imperial standard pounds. Herring barrels or half barrels must be of 26 $\frac{1}{2}$ imperial gallons and 13 $\frac{1}{2}$ imperial gallons respectively in England and Wales if they are presented for the gov. brand at any place at which the Herring Fishery (Branding) Act, 1913, is in force. The Sale of Food (Weights and Measures) Act of 1926 prescribes penalties for selling short weight, measure or number, or for misrepresentation as to weight or measure, etc., or for misstatements on pre-packed articles as

to weight, etc. Except so far as it applies to pre-packed articles, this Act applies only to retail dealings. The Acts of Parliament referring to weight, measures, and coinage may be seen at the British Museum, and, as a rule, in public libraries, assize courts, etc., and a 'Chronological Table and Index to the Statutes' may be obtained from His Majesty's Stationery Office. See Buchanan, *Tables of Weights and Measures*, 1838; Browne, *Money, Weights and Measures of All Nations*, 1899; Martin, *Tables of Weights, Measure and Coinage*, 1904; Board of Trade *Model Regulations*, 1892; *Weights and Measures Acts*, 1878, 1889, 1892, 1893.

Wei-haiwei, formerly a British territory and coaling station in the Chinese prov. of Shantung, with a total area of 285 sq. m., including the Is. of Liukung. In 1895 it was taken from China by the Japanese, who left it three years later. It was then leased by the Chinese Gov. for ninety-nine years to Great Britain, but in accordance with a convention signed April 18, 1930, it was returned to China, Oct. 1, 1930. Farming and fishing are the chief industries of the inhabitants. Pop. about 147,000.

Wei-ho, a riv., China, flows E. through the S. of the prov. of Shenst to join the Hwang-ho above Tungkwan.

Weil, Gustav (1808–89), a Ger. Orientalist of Jewish descent, b. at Sulzburg. He became librarian (1838) and professor of Oriental languages (1861–89) at Heidelberg. Among his publications are: *Mohammed der Prophet*, 1843; *Geschichte der Chalifen*, 1846–51; *Biblische Legenden der Muselmänner*, 1845 (Eng. trans. 1846).

Weimar, a city of Germany, formerly cap. of the grand duchy of Saxe-Weimar, now cap. of Thuringia on the l. b. of the Ilm, 13 m. E. of Erfurt. It is justly famous as having been at one time the residence of the most illustrious men of letters in Germany (e.g. Goethe, Schiller, Herder,

and Wieland) under the patronage of the Duke Charles Augustus. In Feb. 1919 the Constituent Assembly met in W. to draw up the Republican Constitution of Germany. See **GERMANY**. Pop. 41,400.

Weimar, see **SAXE-WEIMAR-EISENACH**.

Weinberge, or Königliche Weinberge, a tn., Bohemia, Czechoslovakia, on the Moldau; an eastern suburb of Prague. Pop. 77,000.

Weinheim, a tn., Baden, Germany, 10½ m. E.N.E. of Mannheim; has tanneries and various manufs. It was destroyed by the Fr. in 1688. Pop. 15,800.

Weinsberg, a tn. Württemberg, Germany, 26 m. N.E. of Stuttgart. The Castle of Weibertreu (woman's faithfulness) was the scene of a famous siege in 1140. Pop. 3700.

Weipert, a tn., Bohemia, Czechoslovakia, on the Erzgebirge, at an alt. of 2380 ft., 37 m. W. by S. of Teplitz; manufs. laces and haberdashery. Pop. 12,000.

Weir, see **RESERVOIRS**.

Weismann, August (1834-1914), Ger. zoologist; b. Jan. 17, at Frankfurt-on-the-Main; son of Johann August W., philologist. Educated: Göttingen. Clinical assistant, Rostock, 1857. Physician to Grand Duke Stephan at Schaumburg, 1861-62. Studied zoology at Giessen, 1863. Professor of zoology, Freiburg-Im-Breisgau, 1871-1912. Leader of Neo-Darwinians, denying transmissibility of characters acquired in an animal's lifetime. Works in Eng. include: *Essays upon Heredity*, etc., 1889-92; *The Germ-Plasm*, 1893; 'The All-Sufficiency of Natural Selection' (*Contemporary Review*), 1893; *Effect of External Influences upon Development*, 1894; *The Evolution Theory*, 1905. Died at Freiburg, Nov. 5.

Weissenburg (Wissembourg), a tn. of France, in Alsace-Lorraine, on the R. Lauter, 20 m. W. of Karlsruhe. Under the old Ger. empire it was a free city until the end of the seventeenth century, when it was ceded to France. In 1870 the first battle of the Franco-Ger. War was fought here, when the Crown Prince of Prussia defeated the Fr. troops under Douay. After the Great War it was returned to France. It is now an industrial tn. with manufs. of leather, matches, and stockings. Pop. 7000.

Weissenfels, chief tn. of a circle of the gov. of Merseburg in the Prussian prov. of Saxony. Pop. 28,600.

Weisshorn, a mountain of the Swiss Alps, canton Valais, between Nidchâtaulth and Val d'Anniviers, W. of the Zermatt Valley, rises to 14,800 ft. The ascent was first accomplished by Professor Tyndall (1861).

Weissmann, Adolf, Ger. musical critic, b. Rosenberg, Aug. 15, 1873. Trained in Berlin; also studied at Breslau, Florence, Berne. Musical critic for *Berliner Tageblatt*, 1900; for *Roland von Berlin*, 1904-10; and since then for the *Vossische Zeitung* and other papers. His *Problems of Modern Music* has been trans. into Eng., 1925; also *Music Come to Earth*, 1930.

Weizmann, Chaim (b. 1874), Zionist leader and chemist, b. at Motol, Grodno, Russia, Nov. 27. Educated at Pinsk and at the universities of Berlin and Freiburg. Lecturer in chemistry at Geneva and reader in biochemistry at Manchester University during the Great War. Later he was appointed director of the Admiralty laboratories engaged in research work on behalf of the War Office. It was during this period that he made the brilliant discovery of a process for the manufacture of acetone, the basis for high explosives. So valuable were his services to the Allied cause that a colony known as the Colony of David was founded in Palestine in his honour. Between 1917 and 1930 W., as President of the World Zionist organisation, was mainly responsible for the political relationship between the Colonial Office and the Jewish Agency in Palestine (see **ZIONISM**). The riots (see **WAILING WALL**) of August 1929 created a great stir throughout the Jewish world, and W.'s failure to obtain from the British Gov. a statement of policy satisfactory to the Zionists led to his resignation from the presidency of the Zionist organisation and the Jewish Agency. Throughout, W. has stood for co-operation between the Jewish people and Great Britain in the development and the upbuilding of Palestine. His publications include various scientific contributions to chemical journals.

Welbeck Abbey, seat of the Duke of Portland, and incorporating the remains of a twelfth-century abbey, stands in a park of 2283 acs., in Welbeck parish, Nottinghamshire, England, 3½ m. S.W. of Worksop.

Welch Fusiliers, The Royal A number of companies were raised in 1686 in the Welsh marches and in 1689 these were regimented and later numbered 23rd Foot. Served under William III. in Ireland and at Namur, and distinguished itself under Marlborough at Blenheim, Ramillies, Oudenarde, and Malplaquet. On returning home received the title 'Prince of Wales's Own Royal Regiment of Welch Fusiliers.' Fought under George II. at Dettingen, and is one of the select few 'Minden' regiments. Further laurels were

gained under Wellington in the Peninsula and at Waterloo, and more in the Crimean War, Indian Mutiny, S. Africa, and China. Raised forty-two battalions during Great War, which served in France, Flanders, Italy, Macedonia, Gallipoli, Egypt, Palestine, and Iraq. The King is colonel-in-chief.

Welch Regiment. Formerly 41st and 69th Regiments. 41st raised 1719 as a regiment of invalids and was composed of out-pensioners of Chelsea Hospital. In 1787 became a regiment of the line. Duke of Wellington served in the regiment for a time. Served in West Indies and Canada frontier campaign of 1812-14, and later in Afghanistan and Crimea. 69th raised 1756 as a second battalion of 24th (South Wales Borderers), but became a single regiment in 1757. Served in America, Gibraltar, in the Fleet at Waterloo. Both regiments linked in 1881. During Great War raised thirty-four battalions and served in France, Flanders, Macedonia, Gallipoli, Egypt, Palestine, and Mesopotamia.

Weld, Woold, Dyer's Rocket, or Greenweed (*Reseda luteola*), a tall plant (order Resedaceæ) with racemes of yellow flowers. It occurs on chalky soils and was formerly grown to furnish a yellow dye.

Welding. The simplest methods of joining pieces of metals are soft soldering, grooving, brazing, and riveting. In all these cases the join represents a definite element of weakness still. Thus in soldering, the composition of the metals at the join is different, and they possess different melting points. In W. two pieces of iron or steel may be joined (after their temperatures have been raised to W. heat) by thorough hammering, and a flux spread over the junction helps to remove any oxide of iron formed as impurity, which is excluded during the hammering. This simple method has many difficulties, particularly as it is not easy to know by mere inspection when the right W. temperature has been attained. Other methods of heating may be employed, such as by special water-gas blowpipes; by electrical methods (resistance and arc W.), and so on. For the W. of metal rails and steel castings, the Thermit process is invaluable. In this a high temperature (3000° C.) results from the change which takes place when a mixture of aluminium and iron oxide is suitably fired. By the use of moulds, the action can be localised round the join, and the iron resulting from the chemical operation, $\text{Fe}_2\text{O}_3 + 2\text{Al} = \text{Al}_2\text{O}_3 + 2\text{Fe}$, melts and joins on to the edges of the break to be repaired. But the

Thermit method has its obvious limitations.

Autogenous W. includes all those cases where the W. metal and the metal to be welded are substantially of the same chemical composition (thus soldering is definitely not of this type), and where some form of blowpipe is used to produce the necessary high temperature required. The most usual types of blowpipe are the oxy-hydrogen (where the combination of oxygen and hydrogen produces the necessary elevated temperature), oxy-acetylene, oxy-benzene, and oxy-coal gas. The metal to be melted and joined to the two sections to be welded is usually in the form of a rod. It is essential that the metal of the rod and the edges to be joined should be melted at the same time. Complications arise in the W. of copper. At the high temperatures employed, oxidation goes on and bubbles of gas cause blistering. In order to avoid this a little phosphorus is incorporated with the W. rod (which is of pure copper otherwise). This element removes both dangers. In the case of brass W. the rod contains a small amount of aluminium in addition to the main constituent brass. A flux such as borax is also added. For details of W. see Granjon, *Autogenous Welding*, trans. Richardson.

Well, see ARTESIAN WELLS, BORING, WATER SUPPLY.

Welland: (1) A tn., Welland co., Ontario, Canada. It is on the W. riv. and canal, has important fruit-shipping trade and manufs. iron castings, tubes, structural iron, and steel, machinery, boilers, twine and rope, cotton and flour. Pop. 8700. The W. Canal (1824-29) between Lake Ontario (Port Dalhousie) and Lake Erie (Port Colbourne) runs parallel with the Niagara R. By the enlarged route (completed 1888) it is 26½ m. long, 14 ft. in depth, and by means of twenty-six locks rises 326½ ft. The W. Ship Canal was begun in 1913, and was opened to ships on April 21, 1931. Construction, however, is still being carried on for the purpose of excavating the canal to a uniform depth of 25 ft. At present (1932) there are parts of a depth of only 18 ft. The length is 27 m., and the width 200 ft. There are seven lift locks having dimensions of 800 ft. by 80 ft. The entrance to the canal is at Port Weller, about 3 m. E. of Port Dalhousie, from which tn. to Allensburg the route is entirely new, but between Allensburg and Port Colbourne the old route is still used. Up to 1930, 112 million dollars had been spent on its construction. See F. W. Wallace, *The Record of Canadian*

Shipping, 1928. (2) A riv., England, rises on the boundary between Northamptonshire and Leicestershire, and flows N.E. to the Wash, which it enters 9 m. below Spalding, to which tn. it is navigable. Length 70 m.

Wellesley, Arthur, *see* WELLINGTON.

Wellesley, Richard Colley, first Marquess Wellesley (1760-1842), a statesman, was the eldest son of Garrett W., first Earl of Mornington, and the brother of the first Duke of Wellington and Lord Cowley. He went to India in 1797 as governor-general, which position he held for eight years, when his policy was much attacked, but finally approved. In 1809 he was sent as ambassador to Spain, and on his return in that year became Foreign Secretary in Perceval's ministry. He was Lord-Lieutenant of Ireland from 1821-28, and again in 1833-34. He retired from public life in 1835. His Indian despatches were pub. in 1836. There are biographies by Pearce (1846), Malletson (1889), and Hutton (1893).

Wellesley College, located at Wellesley, Massachusetts, is one of the foremost colleges for young women in the U.S.A. It was founded in 1870 by H. F. Durant of Boston for the express purpose of giving to young women a higher education equal to that which young men got in other colleges. It opened its doors in 1875. It has endowments of over eight million dollars, about 1600 students, and 154 teachers.

Wellesley Province, *see* PROVINCE WELLESLEY.

Wellhausen, Julius (1844-1918), Ger. Orientalist and biblical critic; b. May 17 at Hameln. Educated Göttingen. Professor of theology, Greifswald, 1872-82; resigned on conscientious grounds. Professor of Oriental languages, Halle, 1882-85; Marburg, 1885-92; Göttingen, 1892-1913. Remarkable for textual criticism and historical reconstruction of Old Testament. Works include: *Text der Bücher Samuels untersucht*, 1871; *Prolegomena zur Geschichte Israels*, 1878; *Die Komposition des Hexateuchs und der historischen Bücher des Alten Testaments*, 1889; *Skizzen und Vorarbeiten*, 1884-99. Died at Göttingen.

Wellingtonborough, a market tn. of Northamptonshire, Eng., on the Nen, has manufs. of boots and lace, and some trade in corn. Iron is mined and foundries worked. Pop. (1931) 21,200.

Wellington: (1) A tn. in Shropshire, England, at the foot of the Wrekin, in an agricultural and mining dist. Pop. (1931) 8200. (2) A tn. in Somerset, England, with manufs. of

woollen and serge goods. The Duke of Wellington took his title from this place, and on the summit of the Black Downs is a monument to his memory. Pop. (1931) 7100. (3) The cap. of New Zealand, a city in the prov. of the same name in North Is., situated on Cook Strait. It is the seat of Victoria College and a branch of the New Zealand Institute. Among its public buildings are: Gov. House, Houses of Parliament, a museum, and Freemasons' Hall. It is a prosperous industrial tn., with manufs. of candles, soap, wool, matches, boots, etc. The ocean trade in 1930 was valued at nearly \$29,000,000. Pop. (1931) est. 143,000 with suburbs. (4) A tn. of New S. Wales, Australia, in Wellington co., on the Macquarie R., 65 m. N.N.W. of Bathurst. The dist. is agricultural, cattle and sheep are reared, and fruit, wheat, vines, etc., are cultivated. There are valuable gold deposits in the neighbourhood. Pop. 4400. (5) A tn. of Cape Colony, S. Africa, about 50 m. N.N.E. of Cape Town, not far from Bain's Kloof pass. Pop. (1926) about 5340 (white 2850). (6) The cap. of Sumner co., Kansas, U.S.A., on Slate Creek, 30 m. S.W. of Wichita, with grain elevators, flour mills, etc. Pop. (1930) 7400.

Wellington, Arthur Wellesley, first Duke of (1769-1852), third son of Garrett W., first Earl of Mornington, b. either at Dangan Castle, co. Meath, Ireland, or at 24 Upper Merrion Street, Dublin (*see* on this *Burke's Peerage* and the *Dict. of National Biography*); educated at Eton, whence he was removed owing to the early death of his father, and later at Pignerol's Military Academy at Angers. Entered as an ensign in the 73rd Regiment in 1787, and then for a few years sat as member for Trim. But after he commenced his military command at the head of a brigade under the Duke of York, in Holland, in 1794, down to the climax of a phenomenal military career at Waterloo, he did not, at least for any appreciable period, pursue politics. It was in India as a colonel in the war against Tippoo that he first gave signs of that transcendent military genius, which in less than twenty years was to earn for him the highest honours it is in the power of any state to confer upon a military hero. After being left in command of the troops at Mysore, he baffled Napoleon's Oriental plan of a descent on Southern India from Egypt as a base, by invading Mysore and destroying or scattering the 40,000 followers of Dhoondyah Waugh before a Fr. soldier could have been sent there. In 1803 he was appointed chief political and military agent in the Deccan and the Southern

Mahratta states, and on the fresh outbreak of trouble with the native chiefs, Sindiah and Holkar, he added to his reputation by the signal defeat of an overwhelming force at Assaye. Though he received the thanks of parliament and was knighted for his services, he does not appear to have been satisfied with either his treatment or his prospects. He advised his brother, the governor-general, to resign on the ground of the hostility of the directors of the E. India Co. and the want of support from the cabinet (*Dictionary of National Biography*). He himself resigned his command and appointment in the early part of 1805, and shortly afterwards sailed for England. In 1806 he was returned as member for Rye, and a year later became Chief Secretary for Ireland and a privy councillor; but on the threat of a Fr. invasion he was soon in active service again. After a short campaign in Denmark, which ended in the complete humiliation of the Danes, he was sent to Spain, when it became clear that it was possible materially to check Fr. pretensions in that country. He landed at Corunna in July 1808, but not being in sole or chief command was almost immediately involved in difficulties with incompetent rivals like Dalrymple and Burrard, much in the same way that his genius was thwarted in India by persons whose social status was in advance of their martial capacity. In 1809, after his return to England and resignation, he was sent out in sole command, and from that point onward began a series of splendid victories which culminated in the complete evacuation of Portugal and Spain by the Fr. He drove Soult from Oporto and routed him near the mountains of Galicia. He then marched into Spain and defeated the Fr. at Talavera (being created Baron Douro of Wellesley and Viscount Wellesley of Talavera). After rendering Lisbon secure by the wonderful achievement of the lines of Torres Vedras, he defeated Masséna, the most famous of Napoleon's generals, at Almeida, and so cleared Portugal of the Fr. He took the fortresses of Badajoz and Ciudad Rodrigo after a fierce fight with Masséna at Fuentes d'Onore, and soon afterwards entered Madrid in triumph after winning the Battle of Salamanca. Other great Fr. armies, however, poured into Spain, and W. wintered, in 1812, within the lines of Torres Vedras. It was at Vittoria that he gained the most decisive victory of the Peninsular War, routing King Joseph and Marshal Jourdan and capturing a vast amount of arms

and ammunition. Soult, unable to drive back the Eng. and the allies, was forced back, after a series of defeats in the Pyrenees, into France, and W., following him up, clinched his brilliant campaign at Toulouse. In 1815, loaded with honours, W. was ambassador to the restored Bourbon court, and British representative at the congress of European Powers at Vienna, when news came of Napoleon's escape from Elba. In a few months W. had rid Europe of any further fear of Napoleon by his last and greatest victory, Waterloo (*q.v.*), and returning to England was granted £200,000 for the purchase of the estate and mansion of Strathfield-saye in Hants, and received with every conceivable honour. Re-entering the political field he was twice Secretary of State, and once Prime Minister. He was by no means a great politician, but was at least honest and sagacious in his opposition to electoral reform and his militarist oppression of the Chartists. Died at Walmer Castle, and buried in St. Paul's Cathedral by the side of Nelson. See W. H. Maxwell's *Life, Military and Civil, of the Duke of Wellington*, 1849; C. D. Yonge's *Life of Field-Marshal the Duke of Wellington*, 1860; G. Lathom Browne's *Wellington*, 1888 (consisting of extracts from despatches and other works); Lord Roberts' *Rise of Wellington*, 1895; Napier's *History of the Peninsular War*; Seborne's *History of the War in 1815*; P. Guedalla, *The Duke*, 1931.

Wellington College, a military school (and railway station), Berkshire, England, 4 m. S.E. of Wokingham, was opened by Queen Victoria (1856), in memory of the Duke of Wellington, for the education of the sons of deceased military officers.

Wellingtonia, see Sequoia.

Wells: A city, bishop's see, parl. and mun. bor. in the co. of Somerset, 120 m. from London. Its history begins in Saxon times, and Ina, King of Wessex, is said to have founded its first church in 704. Its cathedral is mainly Early Eng. It has manufs. of paper, brushes, etc. Pop. (1931) 10,000.

Wells, Charles Jeremiah (c. 1799-1879), an Eng. poet, friend of Keats, Hazlitt, and Hunt, b. at Edmonton. He practised as a solicitor in London (1820-30), and then adopted a literary career, his chief productions being *Stories after Nature*, 1822; *Joseph and his Brethren*, 1824 (new ed. 1876); and *Claribel*, 1845.

Wells, Herbert George, Eng. man of letters; b. Sept. 21, 1866, at Bromley, Kent; youngest son of Joseph W., ex-gardener, general dealer, and

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professional cricketer. Some of his father's characteristics are depicted in *The Veteran Cricketer*, but he had a taste for reading, an intelligent curiosity, and seems to have enjoyed his son's novels, notably *Ann Veronica*. W. was educated at a school known as Morley's Academy in Bromley, which school he has scathingly described in 'The Academy for Young Gentlemen' in the *Journal of Education* (Oct. 1893). But if it was impossible to learn much at such a school, W. read much at home and at the local literary institute. For some years he had to combat his mother's resolve to make a draper of him; indeed he had a month's trial at one firm which, he says, 'rejected him as unsuitable for their high trade.' Doubtless their summary of him was justified, for W. wanted to get back to his books, and the 'high trade' of the local draper is duly lampooned in *The Wheels of Chance* (1896). After taking a certificate of the College of Preceptors with distinction he went to Uppark, where his mother held a post as housekeeper—his father had suffered a diminution of earnings as a cricketer through breaking a leg. W. turned his brief residence here to good account, reading omnivorously. Here he found Plato's *Republic* and the Fr. originals of Voltaire, books which greatly widened the horizon of an inquiring mind hitherto cramped by a narrow environment. In 1881 he became apprenticed to a chemist in Midhurst, and this uncongenial interlude finds its literary expression in *Tono-Bungay* as Wimbleshurst. But during this time he continued at school as a day-pupil, for primarily he was intent on study, and the master of this school, attracted by his ability, offered him a teacher's post in a preparatory school. As a teacher W. drove his pupils hard, made them learn, and continued to work hard at his own studies. Then in 1884 he went to London for three years on a science studentship, going to the Normal School of Science at S. Kensington—the life at which is touched on in his *Ann Veronica*, a novel which was a notable contribution to the cause of women's emancipation. He studied geology, biology, physics, and astronomy, and had 'built up an ordered vision of the world, at least sufficiently coherent for him to plan, while still at S. Kensington, a universal history.' Later he returned to S. Kensington to study for the fellowship diploma of the College of Preceptors and passed with honours, gaining the Doreck scholarship prize for theory and practice of education, thus beating the regular university teachers in their own examinations. He was then

assistant-master at Holt, near Wrexham, but rendered semi-invalid by a football accident. From 1887 he taught at Kilburn for two years. Took the degree of B.Sc., 1st class honours, London University, 1890. Tutor for two years, University Correspondence College; there met Amy Catherine Robbins, who became his wife. Broke a blood-vessel in lungs, 1893, and forced, but probably not against his will, into authorship. His first real literary success was in 1891 when Frank Harris accepted his 'The Rediscovery of the Unique' for the *Fortnightly Review*, and this was followed by some scientific essays in the *Gentleman's Magazine*. At this period, too, while lecturing and coaching, he wrote some books on biology and physiography. While recuperating at Eastbourne he wrote a sketch, 'On the Art of Staying at the Seaside,' which appeared in the *Pall Mall Gazette*, to which he became a regular contributor. From 1894 he was at work on a story which became *The Island of Dr. Moreau* (rejected at its first offer) and then completed *The Wonderful Visit*. He first won nationwide recognition with his *War of the Worlds*, which ran as a serial in the *Windsor Magazine*. It is said that W. T. Stead was the first considerable editor to recognise his genius as a story writer. Stead was certainly impressed with *The Time Machine*, reviewing it most favourably. His earlier novels are scientific romances. In these he established an original type of story evolved from a combination of scientific facts, highly coloured with imagination and frequently told as of the future. The best-known of these, besides those already mentioned, are: *Stolen Bacillus*, 1895; *Platner Story*, 1897; *Invisible Man*, 1897; *Sleeper Awakes*, 1899; *Tales of Space and Time*, 1899; *First Men in the Moon*, 1901; *Food of the Gods*, 1904. His social-science novels are of a different order. They are novels about middle-class problems and reveal great insight into the complexities of the marriage problem. The best of these are *Love and Mr. Lewisham*, 1900; *Kipps*, 1905; *Mr. Polly*, 1910; and *Marriage*, 1912. Early a Fabian, W. cannot be said to be a Socialist in the narrow political sense. His works show a wish to keep Socialism free from the limitations of party politics. W. is more than the mere social regenerator; he is a prophet of world organisation, whether in such fiction as *Mr. Brilling Sees it Through*, 1916, or *The World of William Clissold*, 1926, or in non-fictional works like *God the Invisible King*, 1917; *Outline of History*, 1920 (definitive edition, 1923); *Short History of the World*, 1922, and *Short History of Mankind*, 1925.

W. uses literature to express his views on social or other institutions and only secondarily as a craftsman and artist. But he can write with delicacy and rare verbal felicity, as, e.g., in *The Country of the Blind*, 1911, which is generally admitted to be one of the best short stories in the language. Other works include: *Sea Lady*, 1902; *A Modern Utopia*, 1905; *In the Days of the Comet*, 1906; *War in the Air*, 1908; *Passionate Friends*, 1913; *World Set Free*, 1914; *Bealby*, 1915; *Research Magnificent*, 1915; *Soul of a Bishop*, 1917; *Undying Fire*, 1919; *Secret Places of the Heart*, 1922; *Men Like Gods*, 1923; *Christina Alberta's Father*, 1925; *Meanwhile*, 1927; *Mr. Blettsworthy on Rampole Island*, 1928; *Treasure in the Forest*, 1929; *The King Who Was a King*, 1929; *Autocracy of Mr. Parham*, 1930. Non-fiction: *Text-Book of Biology*, 1893; *Anticipations*, 1901; *Mankind in the Making*, 1903; *Future in America*, 1906; *The Great State*, 1912; *An Englishman Looks at the World*, 1914; *Russia in the Shadows*, 1920; *Story of a Great Schoolmaster* (Life of Sanderson of Oundle), 1924; *Book of Catherine Wells* (memoir of wife), 1928; *Open Conspiracy*, 1928; *Work, Wealth and Happiness of Mankind*, 1932. See Geoffrey West (Geoffrey H. Wells—unrelated), H. G. Wells, 1930 (the fullest biography, with an introduction by H. G. Wells and a full bibliography); F. H. Doughty, *H. G. Wells: Educationist*, 1926.

Wells, Sacred, have been centres of worship and religious magic from the earliest times. The primitive mind associates all the forces of nature with the act of some being capable of volition, and at a certain stage this being becomes conceived of as separate from, and often inhabiting, the place or thing connected with him. Thus it is not strange to find the conception of water-spirits and nymphs in all parts. Great Britain shared this state of mind, and the old conception continued in certain popular ceremonies down to quite recent years, though during the Middle Ages some saint was generally substituted for the original water-deity. Famous British wells are those of St. Winifred (Holywell), St. Chad (Lichfield), St. Anthony (Maybole), St. Keyne (Cornwall), St. Elian (Denbigh). The last named was one of the 'cursing wells,' by certain ceremonies performed at which it was thought that one might bring about the death of an enemy.

Wellston: (1) A city of Jackson co., Ohio, U.S.A., is the centre of a great coal and iron-mining dist. Pop. (1930) 5319. (2) A suburb of St. Louis, Missouri, U.S.A., manufs. tools, electrical goods, etc. Pop. 7312.

Wellsville: (1) A city of Columbiana co., Ohio, U.S.A., on the R. Ohio, 52 m. below Pittsburgh. It is an active commercial centre with various manufs. and coal and clay deposits. Pop. (1930) 7956. (2) A tn. of Allegheny co., New York, U.S.A. Pop. (1930) 5674.

Welsbach, Auer von, celebrated Austrian chemist, chiefly remembered as the inventor of the incandescent gas-mantle (see INCANDESCENT LIGHT), which he put on the market in 1885. He also discovered certain of the elements of the rare earths (q.v.).

Welsh Fusiliers, see WELSH FUSILIERS.

Welsh Guards. Formed on Feb. 26, 1915, as a result of the unanimous desire of the Welsh people, and within four days a guard from the new regiment mounted at Buckingham Palace on St. David's Day (March 1). Two battalions were raised which served during the Great War in France and Flanders, the first battle being Loos. Other outstanding actions in which they participated are Ginchy, Flers-Courcelette, Morval, Pilckem, Poelcappelle, Cambrai, 1917-18, Bapaume, 1918, Canal du Nord, and the Sambre. The Prince of Wales is colonel of the regiment and the King is colonel-in-chief. Their motto is 'Cymru-Am-Byth' ('Wales for Ever').

Welsh Language and Literature, see WALES.

Welsh Onion, a perennial plant with long fibrous roots, said to have been grown first in Germany—the name being derived from *wälsch*, 'foreign.' It is a species of *allium* (*A. fistulosum*) with hollow, inflated leaves, but scarcely any bulb. It is grown for its large, succulent leaves, which are used in salads in the spring.

Welsh Rabbit, the name given to a savoury consisting of cheese which is melted and seasoned and spread over buttered toast. The phrase is probably of slang origin, like *Munster plums*, which means potatoes. The form *rarebit* is doubtful.

Welsh Terrier, a small, attractive terrier of about 20 lb. in weight. Its colour is black and tan, or black, grizzle, and tan, and except for this it strongly resembles the wire-haired fox terrier, though its skull is slightly wider between the ears; these are V-shaped and are carried forward on the cheeks; the neck is moderately long, and the shoulders strong and sloping; the ribs are deep and well sprung, and the chest is deep though narrow; the thighs are muscular and the forelegs straight and well boned; the feet are small and round, and the coat is hard, wiry, dense and close.

Welwitsch, Friedrich Martin Josef (1806-72), an Austrian botanist, b. at Klagenfurt, Carinthia. In 1839 he

went on a botanical expedition to the Cape Verde Is. and the Azores, and became director of the botanical gardens at Lisbon. From 1853 to 1861 he was engaged in botanical expeditions in Portuguese West Africa. In 1863 he settled in London. The *Welwitschia mirabilis*, a remarkable genus of gymnosperms, found in Damara-land, is named after him. The life of this plant, which resembles a huge radish, is said to exceed 100 years. He pub. a valuable work on medicinal herbs of Angola.

Wembley, an urban dist. of Middlesex, near Harrow-on-the-Hill, on the Brent. W. has grown at a very rapid pace during the last twenty years. In 1924-25 the British Empire Exhibition was held at W. and the Stadium, built to hold 100,000 people, is used for the football Cup Final. Pop. (1921) 16,200; (1931) 44,500.

Wemyss, a par., Fifeshire, Scotland, on the Firth of Forth, 2½ m. S.W. of Leven, includes the vils. of Methil and Innerleven, West and East Wemyss, all engaged in coal-mining. Near East W. is Wemyss Castle, once occupied by Mary Queen of Scots. Pop. (1931) 26,619.

Wen, a term popularly applied to any small superficial tumour, and more particularly to sebaceous cysts. These are caused by the obstruction of the ducts of the sebaceous glands, and the consequent distension of the gland by the accumulation of fluid and the thickening of the envelope. They may be removed by making a free incision and clearing out the whole cyst. Cobbett's name for London in the *Rural Rides* was 'The Wen.'

Wenceslaus, or **Wenzel**, was Duke of Bohemia about 928-936. Being converted to Christianity, he endeavoured to make his people also Christians, and was assassinated by his brother in consequence. He was regarded as the patron saint of Bohemia, and he is the 'Good King Wenceslas' of the carol.

Wenceslaus IV., King of Bohemia and Holy Rom. Emperor, the son of the Emperor Charles IV. W. was not a good ruler. In 1394 his own nobles rebelled against him and made him a prisoner, till he was set free through the influence of the princes of the Ger. states.

Wen-Chow, a treaty port of China, in the prov. of Che-Kiang. It is well fortified in an out-of-date fashion, and has manufs. of paper, silk, etc. Pop. (1928) 90,000.

Wenden, or **Venden** (now Tseziz), a tn., Latvia, on the Aa, 60 m. N.E. of Riga by rail, has ruins of a castle which was the residence of the Brethren of the Sword and, from

1237, of the grand-master of the Teutonic Knights. Pop. 7700.

Wendover, a tn., Buckinghamshire, Eng., 5 m. S.E. of Aylesbury. Straw plaiting is carried on. Pop. 1900.

Wends, a Slav race found mainly in Lusatia, a dist. between Brandenburg, Saxony, and Silesia. They are the remnant of a nation which formerly extended as far as the Elbe, but is now decreasing almost daily. About the middle of the sixteenth century, the country of the W. extended eastward to the Oder, but has been gradually reduced since then, and it is significant that now, even within the limits assigned to the W., Ger. is spoken exclusively in the tns. and practically all speak that language as well as Slav.

Wener Lake, see **VENER**.

Wenlock Beds, a series of rocks belonging to the Upper Silurian age. To it belongs Dudley Limestone, a fossiliferous Silurian limestone chiefly developed near the tn. of Dudley.

Wensleydale, in the N. Riding, Yorkshire, Eng., that part of the valley of the Ure beginning near Jervaulx Abbey and continuing until near the source of the riv. W. of Hawes. It is remarkable for its beauty and historical associations, while W. has also given its name to a breed of long-wooled sheep and to a make of blue-mould cheese. Wensley is the prettiest village on the Ure at a point where the riv. is crossed by a fifteenth-century bridge. Wensley Church dates from 1240. Bolton Castle in W. was built by Sir Richard le Scrope, who in 1379 obtained license to crenellate his manorhouse. Mary Queen of Scots was imprisoned there in 1568.

Wensleydale Peerage, an Eng. peerage called after Sir James Parke, Baron Wensleydale, a judge of the court of exchequer, who was created a life-peer in 1856. The House of Lords protested that the privilege of the crown to elect life-peers had fallen into disuse, and if revived the hereditary peers might at the wish of the crown be outnumbered in the House by life-peers. Wensleydale was accordingly created a peer in tail male. Since then a certain number of Lords of Appeal in Ordinary have been created official life-peers.

Wentworth, Thomas, see **STRAF-FORD**, THOMAS WENTWORTH, first EARL OF.

Werden, a tn. of Rhenish Prussia on the Ruhr, 16 m. N.E. of Düsseldorf, with manufs. of cloth, paper, silk, and shoes. It has coal mines and stone quarries. Pop. 10,800.

Weregild. In Anglo-Saxon times a money compensation for murder or manslaughter. W. was first intro-

duced into Gaul by the conquering Franks, and then into Britain by the Saxon invaders. By this system every man's life had a fixed pecuniary value called the W., and the amount was graduated according to the rank of the person slain; for example, a churl's value was fixed at 200 s.; a lesser thane, 600 s.; a king's thane, 1200 s.; an ealdorman, 2400 s.; an aetheling or prince, 3600 s., and a king 7200 s. The W. of a murdered freeman was payable as compensation to his kin; that of a serf was paid to his master.

Were-Wolf, see LYCANTHROPY.

Werfel, Franz, novelist and playwright, b. of Jewish stock at Prague, Sept. 10, 1890, but is not considered a Czech writer, as he writes in German. Educated at Prague and Hamburg, entered the Civil Service and during the Great War served on the Russian front. His first book of poems, *Die Wulfenfreund*, appeared in 1912, and W. was considered in Austria-Hungary before the war as the leader of the expressionist school. He is best known as a dramatist, and his play, *The Goat Song* (1921; Eng. trans., 1926), was produced in New York as well as in Vienna and Berlin. Perhaps his greatest romance is *Verdi* (Eng. trans., 1925). Other works trans. into Eng. are *Juarez* and *Maximilian* (1926), *The Man who Conquered Death* (1927), *Paul among the Jews* (1928), *The Glass Reunion* (1930).

Wergeland, Hendrik Arnoldus (1808-45), a Norwegian poet, b. at Christiansand. After passing through the university, he pub. a successful dramatic satire. His friends called him the 'Byron of Norway.' W. entered the clerical profession in 1829, but in 1834 resigned. The sentiments expressed in a poem entitled *Creation, Man and the Messiah*, were deemed incompatible with his sacred calling. He was appointed keeper of the university library, and in 1840 keeper of the Norwegian archives. A collected edition in 9 vols. of his works was begun in 1851.

Werner, Abraham Gottlob (1750-1817), a geologist, was b. at Wehrau in Lusatia. Having written a treatise *On the External Characteristics of Minerals*, he became professor of mineralogy at Freiburg in 1775.

Werner, Alfred (1866-1919), a chemist of Fr. extraction who held the professorship of chemistry at Zürich from 1893 till 1919, and was awarded the Nobel prize in 1913. His principal contribution to chemistry was his theory of co-ordinate valency, based upon his study of complex metal-ammonia compounds. This theory has been largely incorporated

in modern hypotheses as to the nature of valency, and represented remarkable insight into the mechanism of chemical combination. See his *Neuere Anschauungen auf dem Gebiet der anorganischen Chemie*, or Eng. trans.

Werner, Friedrich Ludwig Zacharias (1768-1823), a Ger. dramatic poet and priest, b. at Königsberg in Prussia. While at the university of Königsberg, he came under the influence of Rousseau's teaching and became an ardent romanticist. In 1811 he was converted to the Rom. Catholic Church, and three years later was ordained priest and became a popular pulpit orator in Vienna. His *Der Vierundzwanzigste Februar* (1815) set the fashion of writing 'fate tragedies.' His other works include *Die Söhne der Thals*, 1803; *Martin Luther*, 1806; and *Wanda*, 1810. See *Lives* by Schütz (1841) and Poppenberg (1893).

Wernher, Sir Julius Charles, Bart. (1850-1912), Ger.-British financier; b. April 9, at Darmstadt; son of Friedrich August W., railway engineer. Educated at Frankfurt-on-the-Main—there gained experience in a bank. Served in Franco-Ger. War. Went to S. Africa, 1871, assistant in Fr. diamond-house. In London, 1880-82, and at later intervals. In 1888 governor of De Beers, and in 1890 senior partner in Wernher, Beit, & Co. Bart., 1905. Gave large amounts to charitable and educational concerns.

Wernigerode, a tn. in the prov. of Saxony, Prussia, at the foot of the Harz Mts. It contains the fine château of the princes of Stolberg-Wernigerode, with its valuable library. Pop. 11,700.

Werther, see GOETHE, JOHANN WOLFGANG.

Wesel, a tn. and fortress, Westphalia, Prussia, at the confluence of the Rhine and the Lippe, 46 m. S.W. of Münster, has a trade fair, instituted in 1921, and manufs. of wire, lead, and other metal goods, pottery, cables, pianos, cement, and soap. Pop. 24,200.

Weser, one of the largest rivs. of Germany, formed by the junction of the Werra and the Fulda, the latter of which rises in the Rhönegebirge in Bavaria. From the junction at Münden the riv. flows towards the North Sea, into which it falls after a course of 225 m.

Wesermünde, a seaport in Hanover, Prussia, situated on the estuary of the Weser. The artificial harbour was constructed in 1846. Woollens, wire ropes, and sails are the chief manufs. W. is the chief station of the deep-sea fishing fleet. Pop. 72,100.

Wesley, Charles, *see* WESLEY, JOHN.

Wesley, Charles (1757-1834), and Samuel (1766-1837), sons of Rev. Charles W. of Bristol, nephews of the famous Rev. John W., both celebrated musical prodigies. Charles was a good organist, and left six organ concertos, a drama, songs, anthems, and other compositions. Samuel wrote an oratorio, *Ruth*, at eight, became one of England's finest organists, and devoted considerable energy to popularising J. S. Bach.

Wesley, John (1703-91), a Methodist, was a younger son of Samuel W., rector of Epworth and Wroot, and author of many poems. He was educated at Charterhouse, London, and Christ Church, Oxford, and took holy orders in 1725. He served his father as curate at Wroot from 1727-29, and then returned to the university as tutor in Lincoln College, which position he retained for six years. At Oxford, his younger brother, *Charles Wesley* (1707-88), had formed a small group of undergraduates who followed very strictly the ordinances of the church and were dubbed by their friends 'Methodists.' W. joined the party and became its leader. Soon after his father's death in 1735, he went to America to take charge of the Georgian mission, but in the following year retired from the charge owing to his being involved in legal proceedings consequent upon his having repelled one of his congregation from the communion. On his return he came under the influence of Peter Böhler, a Moravian, and became a member of that society's chapel at Fetter Lane, London; but in 1740 he broke off his connection with it. He and his brother Charles, Whitefield, and others set up an independent society which met at the Old Foundry near Moorfields, London. In the previous year he had begun field-preaching and soon after opened a Methodist chapel at Bristol. W. made Bristol his headquarters, and he divided his followers into classes, each class being under the direction of a leader. Rules for the conduct of the classes were drawn up in 1743. He preached all over the country and was especially successful with the poorer classes, who were less in touch with the Established Church than the well-to-do. It was not until 1784 that W. executed the 'deed of declaration,' from which dates the beginning of modern Methodism. W. d. on March 2, 1791. His brother, Charles, had d. three years before. John W. wrote many books and pamphlets, and he edited the first 'Everyman' series—*The Christian Library*. W.'s *Journals* are the best authority for

his career, but there are biographies by Coke and Moore (1792), Whitehead (1791-93), Southey (1820), Tyerman (1870), and Telford (1886). *See also* J. S. Simon, *John Wesley and the Advance of Methodism*, 1925; G. Bayrs, *John Wesley*, 1926; W. H. Hutton, *John Wesley*, 1927; J. E. Rattenbury, *Wesley's Legacy to the World*, 1928; J. Telford, *Wesley as a World Force*, 1929; A. Lunn, *John Wesley*, 1929; and *The Letters of John Wesley*, ed. by J. Telford, 1931.

Wesley, Samuel Sebastian (1810-76), was, like his father, Samuel W. (*q.v.* under WESLEY, CHARLES), the finest organist of his day; his appointments included Hereford Cathedral (1833-35), Leeds parish church (1842-49), and Gloucester Cathedral (1865-76). He left much magnificent church music, anthems, services, and organ pieces, and the fine work *The Wilderness*, his best-known composition.

Wesleyan Methodist Churches, *see* METHODISM.

Wessex (O.E. *West-seaxe*, West Saxons), an ant. kingdom in S.W. Britain, founded by the W. Saxons or Gewissas, under Cerdic and his son, Cynric, in A.D. 519. The invaders were defeated at Mons Badonicus (520), but won a great victory at Cerdicolea (527). Cerdic died in 534, and Cynric extended his kingdom beyond Hampshire and over the Is. of Wight. His son, Ceawlin (560-91), was a warlike king and made repeated inroads upon his British neighbours. In 591 his own subjects rebelled against his authority at Woddesboerg, and Ceawlin abdicated and d. in exile. The territory he had conquered beyond the Thames was seized by the Mercians, and Wessex ceased to be a powerful state. In the seventh century the W. Saxons were converted to Christianity. During the reign of Cuthred (741-54) the Mercians were defeated at Burford (752) and a code of laws drawn up. Egbert (800-36), who had spent his youth in exile at the court of Charles the Great, restored W. to its former power, and ultimately conquered the whole of England. He defeated the men of Cornwall in 815 and 835, subdued Mercia (825-29), annexed Kent, Sussex, and Essex, and before 828 was acknowledged overlord by all the peoples S. of the Tweed. W.'s territory was increased and her power strengthened under Alfred (*q.v.*). Consult Elton, *Origins of English History*. *See also* HARDY, THOMAS.

West, Benjamin (1738-1820), an American historical painter, b. at Springfield, Pennsylvania. He began portrait painting at sixteen, and produced his 'Death of Socrates,' but in

1760 went to Italy to study, and settled in London in 1763. Here he came under the notice of George III. and soon acquired a great reputation for his historical and religious subjects; indeed, so high was he in favour that on the death of Reynolds he was made president of the Royal Academy. Among his pictures are 'Christ healing the Sick' and 'The Death of Wolfe.' He was the first to abandon the Gk. and Rom. and introduce modern costume into historical painting.

West Africa, British, *see* GAMBIA, GOLD COAST, NIGERIA, SIERRA LEONE.

West Africa, French, *see* DAHOMEY, FRENCH CONGO, FRENCH GUINEA, IVORY COAST, SENEGAL, UPPER.

West Africa, German, *see* AFRICA, SOUTH-WEST, CAMEROON, TOGOLAND.

West Africa, Portuguese, *see* ANGOLA, PORTUGUESE GUINEA.

West Africa, Spanish, *see* FERNANDO PO, RIO DE ORO, SPANISH GUINEA.

West Allis, a banking tn. of Milwaukee co., Wisconsin, U.S.A., incorporated in 1906. It shows rapid growth in twenty years, and manufs. mining and other machinery, tanks, castings, radios, agricultural machinery, etc. Pop. (1930) 34,671.

West Bay City, *see* BAY CITY.

Westborough, a tn. in Worcester co., Massachusetts, U.S.A., 32 m. S.W. of Boston. It has a state lunatic asylum, and manufs. of shoes, leather and straw goods, carpets, etc. Pop. (1930) 6409.

West Bromwich, a parl., mun., and co. bor. of Staffordshire, England, 5 m. N.W. of Birmingham. It is a busy industrial tn. in the heart of the 'Black Country,' with manufs. of hardware, iron goods, bricks, etc. Pop. (1931) 81,300.

Westbrook, a tn., Cumberland co., Maine, U.S.A., has paper, silk, and cotton mills. Pop. 10,807.

Westbury, a market tn. of Wiltshire, England, 4 m. S.S.E. of Trowbridge. It has a fine old church with historic associations, and its manufs. include woollens, clothing, and iron goods. Pop. (1931) 6600.

Westbury, Richard Bethell, Baron (1800-73), Lord Chancellor of England, b. at Bradford-on-Avon. He was elected fellow of Wadham College, Oxford (1819), was called to the Bar at the Middle Temple (1823), and became leader of the Chancery Bar (1841). He entered parliament as Liberal representative for Aylesbury (1851), and in the following year was returned by Wolverhampton, becoming Solicitor-General (1852), Attorney-General (1856), and Lord Chancellor (1861). He delivered judgment in the

famous *Essays and Reviews* case of 1863. *See* Life by T. A. Nash.

West Chester, a bor. and co. seat of Chester co., Pennsylvania, U.S.A., 25 m. W. of Philadelphia; has large market gardens and dairy farms and manufs. agricultural implements. Pop. 12,325.

Westcott, Brooke Foss (1825-1901), Bishop of Durham, Eng., b. at Birmingham. He took holy orders in 1851, was made canon of Peterborough (1869), regius professor of divinity at Cambridge (1870), chaplain to Queen Victoria (1870), canon of Westminster (1883), and Bishop of Durham (1890). He edited the N.T. in Gk. with Dr. Hort (1882), and wrote: *History of the New Testament Canon*, 1855; *Introduction to the Study of the Gospels*, 1860; *Revelation of the Risen Lord*, 1881; *Social Aspects of Christianity*, 1887, etc. *See* Lives by B. F. Westcott (1903) and J. Clayton (1906).

Wester Wemyss, Rosslyn Erskine Wemyss, first Baron, British Admiral of the Fleet; b. April 12, 1864; third son of James Hay Erskine Wemyss, of Wemyss Castle, Fife. Entered navy, 1877; captain, 1901; rear-admiral, 1912. In Great War, commanded squadron at landing of troops in Gallipoli, April 1915. Vice-admiral, 1916. Commander-in-chief, E. Indies and Egypt, 1916-17. Member War Cabinet, 1918. First Sea Lord, 1917-19. Admiral, and ennobled, 1919. Retired, 1929.

Westerly, a tn. of Washington co., Rhode Is., U.S.A., on the Pawcatuck R.; with woollen and cotton mills, granite quarries, and a printing industry. Pop. (1930) 10,997.

Westermarck, Edward Alexander, Finnish anthropologist; b. Nov. 20, 1862, at Helsingfors; youngest son of N. Chr. Westermarck, assessor. Educated: Svenska Normallyceum, Helsingfors; University of Finland. Professor of philosophy at Academy of Abo, Finland. Professor of sociology, University of London, 1907-30. Works in English: *Origin of Human Marriage*, 1889; *History of Human Marriage*, 1891 (5th ed. rewritten, 3 vols., 1925); *Origin and Development of the Moral Ideas*, 1906-08; *Marriage Ceremonies in Morocco*, 1914; *Ritual and Belief in Morocco*, 1926; *Short History of Marriage*, 1926; *The Goodness of Gods*, 1926; *Memories of My Life* (in Swedish), 1927 (Eng. trans., 1929); *Will and Wisdom in Morocco*, 1930; *Ethical Relativity*, 1932.

Western Australia, a state of the Commonwealth of Australia, comprising nearly one-third of the Australian continent, or all that portion W. of 129° E. longitude. It is bounded on the N.W. and S. by

the Indian Ocean, and on the E. by N., Central and S. Australia. The total area is 975,920 sq. m., extreme length from N.E. to S.W. 1480 m.; extreme width from E. to W. 1000 m.

Physical Features.—The southern and western coast lands are more or less flat and sandy, even though mostly protected by rocky cliffs and headlands, or dunes; there are here comparatively few natural harbours or other indentations, until the Kimberley division is reached, where the character of the coast becomes bold and broken, and fringed with numerous islands. The total length of the coast-line is estimated to be 4350 m. The islands are, generally, small and unimportant, the best known being Garden and Rottnest Islands off Fremantle; the Houtman Abrolhos, near Champion Bay, in which guano is found; Dirk Hartog and other islands in Shark Bay, used for pastoral purposes; Dampier Archipelago and the Montebello Group on the N.W. coast, and off the northern coast the Lacepedes, on which are guano deposits, and the Buccaneer and Bonaparte Archipelagos, for the most part unexplored. Large areas for hundreds of m. inland are hilly and even mountainous, although the altitude rises nowhere above that of Mount Bruce in the N.W., or Bluff Knoll (Stirling Range) in the S.W. The greater portion of the far interior may be described as an immense table-land, with an altitude of from one to two thousand ft. above sea-level, the surface of which consists in parts of sand-dunes, varied by wide stretches of clayey soils. Long, straggling rivs., broken during the summer into a series of pools, cross the country as far inland as the hills extend, widening in many cases nearer the coast into large sea-estuaries. In the Kimberley dist. the principal range of hills is the King Leopold Range, the highest point of which is Mt. Broome (3040 ft.). In the N.W., between the Fortescue and Ashburton Rs., the highest range is the Hamersley, with Mt. Bruce (4024 ft.) in the vicinity. The Darling Range, which extends from Yatheroo in the N. to Point D'Entrecasteaux in the S., a distance of 300 m., reaches its highest elevation, 1910 ft. above sea-level, at Mt. Cooke in the Cockburn Sound dist. In the S. the loftiest range is the Stirling Range, with Bluff Knoll (3640 ft.). Between it and the coast, and parallel with both, extends the less elevated Porongorup Range. No active volcanoes exist, but the craters of several extinct ones are reported to have been discovered in the N.W. and in the Kimberley dist. in the neighbour-

hood of the sixteenth parallel of latitude. The appearance of the whole of the country, with perhaps the exception of some parts of the Kimberley dist., indicates a condition of remarkable quiescence as far back as the carboniferous epoch. The principal rivs. are: in the N., the Ord, with its tributaries, Denham, Bow, Negri, and Panton; the Pentecost, with its tributary, the Chamberlain; the Durack, Drysdale, King Edward, Prince Regent, Charnley, Isdell, and the Fitzroy, with its tributaries, the Margaret and Hann Rs. and Christmas Creek. In the N.W. the De Gray, with tributaries Oakover and Shaw; the Yule, Fortescue, and Ashburton, with its tributaries, the Henry and Hardy. Draining into the western coast are the Minilya, Gascoyne, with its tributary, the Lyons; the Wooremel, the Murchison, the Greenough, the Swan, on which is Perth, which, inland, is called the Avon (W. A. was originally known as the Swan R. Settlement); the Murray, the Collie, and the Preston; and, on the southern coast, the Blackwood, Donnelly, Warren, Deep, Frankland, Denmark, Hay, Kalgar, Pallenup, Gairdner, Fitzgerald, and Phillips Rs. There are no lakes of any considerable importance. Between the Darling Range and the coast are a few salt-water lagoons, and many freshwater lakes, mostly nothing more than swamps during the dry season, and none of any economic importance. The so-called lakes of the interior, which are frequently of very considerable area, are, except after the occasional heavy rains, merely immense salt marshes. W. A., though not possessed of majestic mountain heights, has a share of natural beauty as rich and varied as may be found, exhibited in, to name two features out of several, the ruggedness of its hills and the grandeur of its forests. On the Warren R., in the S.W., it is not unusual to find Karri trees which attain 300 ft. in height. The most remarkable special feature is found in the many beautiful limestone caves, those of the Margaret R. being of exceptional grandeur and picturesqueness. The *climate* is most temperate, especially in the S.W. where excessive cold is never, and excessive heat very rarely, known. The summer heat, which is mostly dry with hardly any rainfall, is during the greater part of the hot season relieved by cool sea-breezes. The winters are rainy, but with occasional dry spells.

Fauna and Flora.—In common with other parts of Australia, the state has a fauna chiefly remarkable for its marsupials. It has, however,

a large number of beautifully coloured birds. The flora of the S.W. is one of the richest known, the wild flowers of the state being of unusual variety and beauty.

Land Settlement.—Some two-thirds of the area of the state is suitable for pastoral purposes, immense tracts having been proved eminently so. The portion of the state more immediately fitted for agricultural purposes and closer settlement is the S.W. division, containing an area of 98,305 sq. m., of which some 55,900 sq. m. have been alienated or are in process of alienation. It has large areas specially suitable for mixed farming, dairying, potato and fruit growing, and large portions are covered with forests of considerable commercial value.

Production and Industries.—It is some years now since the immense capabilities of the state as one of the world's great wheat-producers were generally realised. During the last decade, marked progress has been made in the production of wheat and also wool. Until about thirty years ago the state did not produce enough wheat for its own requirements, but for some years past the export of wheat has been one of the state's chief assets. In the year 1919, after the Great War, the production of wheat totalled 8,845,387 bushels, and by the year 1924 this had been more than doubled. Between the latter year and the year 1930 the production increased from 18,920,271 bushels to 39,081,183 bushels. During the last-mentioned period of six years the area under crop or wheat increased from 1,656,915 acs. to 3,568,225 acs., and in the season 1930–31 about 3,956,500 acs. were stripped for grain, for a production of over 50 million bushels. Also during this period of five years from 1924 to 1929 the production of wool increased from 47 to 73 million lb. Fruit production has increased considerably in recent years and has created a large export trade to foreign markets. Such progress has been made that during the season 1928–29 a record shipment to overseas countries was sent of over 737,500 cases, mostly apples. A very extensive portion of the South-Western and Eucla divisions of the state, containing many millions of acs., is especially suitable for wheat-growing, whilst the hills of the Darling Range and many other portions of the state produce apples, oranges, grapes, and other excellent fruit in the greatest variety. For a long period lead and copper mines were worked in the vicinity of Champion Bay, but of late years little continuous work has been done in them. Copper is found,

however, in other dists., notably those of Mt. Morgans, Phillips R. and W. Pilbarra. The other mineral resources of W.A. were almost unknown and quite undeveloped until three decades ago. Gold was found in considerable quantities in the Kimberley goldfield in 1887 and this, attracting experienced miners, led to the discovery of great quantities elsewhere. After the opening up of the goldfields of W. A., gold mining became for a time the principal industry of the state, and indeed the state produces as much as 79 per cent. of the total gold output of Australia. The value of the output for year ending Dec. 31, 1931, was £2,168,770. The total value of gold produced in W. A. is £164,872,935. Good coal is found at Collie in the S.W., and there is evidence of its existence in the Champion Bay and Irwin R. dists. (output in 1928–29 was 541,617 tons). Large deposits of stream tin were discovered in 1888 at Greenbushes, on the Blackwood R., and much tin has also been raised at Marble Bar. Other minerals found are silver, antimony, bismuth, tantalite, lead, asbestos, arsenical ore, mica, wolfram, gadolinite, molybdenite, graphite, magnetite, pyritic ore, limestone, and ironstone. Wool-growing is one of the chief industries. In 1930 there were 9,874,970 sheep depastured in the state, and the wool clip for the year, including wool exported on skins, was 76,951,500 lb. Over a quarter of a million gallons of wine are made annually. Fruit-growing is an increasing industry, the export for the year ending June 30, 1931, being realised at £371,710. Timber is also an important product, Western Australian jarrah being known throughout the world for its durability; and sandalwood is still abundant. The value of timber exports is about £1,000,000 annually. There are pearling banks at Broome and on the N.W. coast generally, the export of pearls and shell being valued at £178,000 in 1929–30.

Education.—Gov. primary schools exist in all parts of the state and attendance is compulsory for all children between the years of six and fourteen. Children who complete the primary course may pass to a dist. high school for a secondary course of five years or to the upper classes of a central school for a two-year course. Technical schools are established in the principal centres. The university in Perth provides courses for degrees in Arts, Science (including Agriculture), and Engineering.

Communications and Population.—There are 4111 m. of main railroads: Eastern Railway from Fremantle to

Perth and Northam (218 m.); S. Western Railway, from E. Perth Junction to Bunbury and Jardee (795 m.); Great Southern Railway, Spencer's Brook to Albany (1015 m.); Eastern Goldfields Railway, Northern to Southern Cross (792 m.); Northam-Mullewa Railway (601 m.); Northern Railway, Geraldton to Meekatharra (542 m.); Hopetown-Ravensthorpe Railway (34 m.), and Port Hedland-Marble Bar Railway (114 m.). A high-power wireless station has been erected at Applecross, between Perth and Fremantle, by the Commonwealth Gov. There are also lower-power stations at Esperance, Geraldton, Broome, and Wyndham. The chief port is Fremantle, which is the first and last port of call in Australia for all mail and other liners using the Suez route, and for many on the Cape route (tonnage for the year ending June 30, 1931, 3,464,655). The pop. in 1921 was 332,732; in 1931 est. at 420,632, excluding aboriginal natives. The chief tn. is Perth (pop. metropolitan 154,873 in 1921; est. 202,888 in 1929). The ports, with their pops., are Fremantle (33,535), Albany (3980), Bunbury (5100), Geraldton (4627), and Broome (1031). The chief centre of the agricultural dists. is Northam (5000), of the gold-fields areas, Kalgoorlie (11,105), including Boulder, and of the coal mines, Collie (3500).

Constitution and Government.—Responsible gov. was granted to W.A. in 1890. The legislature consists of two Houses; the Legislative Council, with thirty members, and the Legislative Assembly, with fifty members. Both Houses are elective. Women are not disqualified by reason of sex either for election or as voters.

Early History.—Probably the earliest exploration was that which is recorded in the words cut into the tin plate now in the State Museum at Amsterdam, which was nailed on Oct. 25, 1616, by Dirk Hartog, the commander of the Dutch vessel, *Eendracht*, to a post erected on Point Inscription on what is now Dirk Hartog Island. The first Englishman to land on these coasts was William Dampier, who, in 1688, in the *Cygnet*, landed at King Sound. Fr. navigators followed during the next century, notably D'Entrecasteaux in *La Recherche* in 1792, de Freycinet in 1818, and de Bougainville in 1825. In 1791 Vancouver, in the *Discovery*, took formal possession of the country above King George Sound; in 1801 Matthew Flinders, in the *Investigator*, explored the southern coast which, at his suggestion, subsequently received the name of Australia; whilst between 1818 and 1822 Philip Parker King

charted the northern coasts. In 1826 the gov. of New S. Wales sent some convicts and a detachment of soldiers to King George Sound and formed a settlement then called Fredericks Town. In 1827 Captain James (later Sir James) Stirling surveyed the coast from the Sound to Swan R. and in 1829 Captain (later Sir Charles) Fremantle in H.M.S. *Challenger* took possession of the territory, and founded the Swan R. Settlement, which is now the state of W.A., and the tns. of Perth and Fremantle, and was the first Lieutenant-Governor.

Aborigines.—The aboriginal pop. was estimated in 1930 to be 26,286 (excluding half-castes), 16,286 of whom are in touch with civilisation, and the remainder in those parts of the state as yet uninhabited by the white man. The aborigines are still assisting to no small extent in the development of the northern portion of the state, chiefly as stock boys, shepherds, station hands, domestic servants, etc. Generally speaking, the aborigines are not hostile, though at times they are troublesome owing to their proneness to cattle-killing. The policy of the Aborigines Department is in the direction of inducing the natives to support themselves by their own labours, and this policy is worked through a number of native stations and settlements set up in the N. and S. Consult works by Favenc, 1887; Calvert, 1894, 1897; Chambers, 1897; Vivienne, 1901; see also H. Taunton, *Australind*, 1903; H. P. Colebatch, *A Story of One Hundred Years*; J. S. Battye, *Western Australia: A History from its Discovery to the Inauguration of the Commonwealth*, 1924.

Western Pacific Railroad Corporation was founded in the U.S.A. in 1916 as the holding company managing the Western Pacific Railroad system. It owns a half-interest in the Denver and Rio Grande Railway.

Western Reserve, a portion of N.E. Ohio, U.S.A., bordering on Lake Erie, the claim to which (based on her old charter) was reserved by Connecticut when she surrendered to the Federal Gov. her claims to land N. and W. of the Ohio. Cleveland was founded here in 1796.

Western Reserve University, a non-sectarian university for men and women, founded at Cleveland, Ohio, in 1826. Besides the Adelbert College for men and a college for women, it has schools of medicine, pharmacy, law, dentistry, nursing, science, applied social science, education, etc. It has 386 professors, associate professors, and instructors, besides 150 lecturers and demonstrators, nearly

4000 students, and a library of 300,000 volumes.

Western Union Telegraph Company, a large commercial cable company which was incorporated in 1851 for transmission of messages between London and New York. Capital stock, issued, now 102,378,139 dollars, and capital stock of subsidiary companies 1,765,550 dollars. Chief offices, 60 Hudson Street, New York, and Western Union House, Great Winchester Street, London. Has branches in all the chief provincial cities of Great Britain. It is one of the two great telegraph companies of the U.S.A., with service to practically every town of any importance.

Westfield: (1) A tn. of Hampden co., Massachusetts, U.S.A., 9 m. W. of Springfield; with manufs. of bicycles, cigars, whips, paper, machinery, etc. Pop. (1930) 19,775. (2) A tn. of Union co., New Jersey, U.S.A., 7 m. W. by S. of Elizabeth. It is residential, and also has dairy, poultry, and flower farms. Pop. (1930) 15,801.

West Flanders, a prov. of Belgium, lying N. and E. of France, and bounded on the N.W. by the North Sea. With E. Flanders it was incorporated with the newly formed kingdom of Belgium in 1831. The surface is flat, and the soil well cultivated for agricultural purposes. Its capital is Bruges. Area 1249 sq. m. Pop. 884,800.

West Ham, a parl. and co. bor. of Essex, England, and an eastern suburb of London. It adjoins East Ham, and has a shipbuilding industry. Pop. (1931) 294,100.

West Hartlepool, see **HARTLEPOOL**.

West Haven, a tn., New Haven co., Connecticut, U.S.A., separated from New Haven by the West R.; manufs. tools, motor-boats, and musical instruments. Pop. (1930) 25,809.

West Hoboken, a tn. of Hudson co., New Jersey, U.S.A., about 2 m. W. of New York, and adjoining Jersey City and Hoboken. Chief manufs. are silk and embroideries. Pop. 35,400.

Westhoughton, a tn. in Lancashire, England, situated between Bolton and Wigan, 5 m. from each. There are large collieries and cotton factories. Pop. (1931) 16,000.

West Indies, an archipelago extending from the Florida Channel (N. America) to within 7 m. of the coast of Venezuela (S. America). It was so called by Columbus in 1492, who believed that the islands formed the western limits of India. The total area is nearly 100,000 sq. m., of which 72,000 sq. m. are independent, 12,300 British, 3750 U.S.A., 1350 Fr., 430 Netherlands, 140 Danish, and 90

Venezuelan. The archipelago is divisible into three groups: the Greater Antilles consisting of Cuba and Hispaniola (independent), Jamaica and its dependencies (British), and Puerto Rico (U.S.A.); the Bahamas, which are entirely British; and the Lesser Antilles, which are divided among the United Kingdom, France, the Netherlands, Venezuela, and the U.S.A. In 1917 the U.S.A. bought the Virgin Islands, formerly the Danish West Indies, from Denmark. The total area which changed hands was 132 sq. m. Proposals for Federation in the British W. I. have been made, and, with the improved communications brought about by flying, may eventually take place. The islands are unfortunately subject to hurricanes. In 1926 a hurricane visiting Cuba is estimated to have done 20 million pounds' worth of damage. Circular wings made of solid concrete are being built on to houses to provide a refuge for the inhabitants during the storms. In the summer of 1928, Haiti had a serious hurricane causing much damage and loss of life by flood, while the autumn of the same year saw one of the most destructive hurricanes on record. The wind reached over 150 m. per hour. Dominica, Antigua, St. Kitts, and Nevis suffered severely, there was great loss of life and property in Guadeloupe, and Puerto Rico suffered most of all, losing hundreds of lives, and 70 per cent. of the private houses.

Relief and Hydrography.—The Bahamas are partly of coral formation and generally low. There is practically no running water, though there are ample underground supplies. In the W. of Cuba are the Sierra de los Organos, reaching a height of over 2500 ft., and at the extreme eastern end of the island is a range of mountains facing S., the Sierra Maestre (4000 ft. mean altitude); but the island is divided into two parts by a large marshy depression 47 m. wide, between the N. and S. coast. In consequence of Cuba being largely composed of limestone the drainage is partly underground, and many rivers are lost in swamps. Hispaniola (San Domingo and Haiti) is generally mountainous, the highest summit exceeding 10,000 ft. Puerto Rico is an elevated plateau with a large number of rivers. In Jamaica the Blue Mts. exceed 7000 ft., but in the centre and W. is a limestone plateau with deep valleys with self-contained drainage. S. of Puerto Rico the islands form a deeply submerged mountain ridge separating the Caribbean Sea from the Atlantic Ocean.

Ethnology and Religion.—The races inhabiting the W. I. when Columbus

reached them were Arawak and Carib Indians, who have gradually decreased in numbers, and are largely replaced by the negroes. Negroes have largely increased since their emancipation, and quite two-fifths of the total pop. are now negroes and mulattoes. There has been also a considerable influx of coolies from India and China to work in the plantations. In Cuba and Puerto Rico whites are in the majority, but they are largely outnumbered in the other islands, and in Haiti practically the whole pop. is negro. The negroes are nominally Protestant, but in Cuba and Puerto Rico the religion is Rom. Catholic, the people being of Spanish descent. Jewish synagogues, Hindu temples, Mohammedan mosques, and Buddhist temples have all been built in the islands, while the aborigines adhere to their ant. faith.

Productions.—The flora of the W. I. is of great variety and richness. The sugar cane and tobacco plant are extensively grown, and among other crops are beans, peas, rice, maize, and Guinea corn. The extension of the beet-sugar industry in Europe has caused a slump in the cane-sugar industry. In 1929 Lord Olivier formed a commission to investigate the position, and reported that the industry will be practically ruined if preference or some equivalent assistance is not given to the growers. Preferential tariff in Canada has helped, as also the subsidised Canada-W. I. steamer service. Forests are numerous and wide-spreading, and produce valuable woods and delicious fruits. Palms are in great variety, and there are several species of gum-producing trees. Some locust trees have been estimated to have attained an age of 4000 years, and are of immense height and bulk. There are few mammals, but there are plenty of wild dogs and pigs, as well as opossums, musk-rats, and armadillos. Water-fowl and various kinds of pigeons are in abundance, and there are many parrots and humming birds. Among domestic animals mules are largely reared, and, where possible, cattle-breeding is practised. Goats abound, and large flocks of sheep are kept. Pop. about 7,000,000. See articles relating to the various islands. See also G. Manington, *The West Indies*, 1930.

Westinghouse Brake, see **BRAKE**.

Westlake, John (1828-1913), Eng. jurist, b. at Lostwithiel, Cornwall, Feb. 4, son of John W., a woolstapler. Educated at Cambridge University. Called to the Bar in 1854. Succeeded Henry Sumner Maine (q.v.) as Whewell Professor of International

Law, Cambridge. Eminent alike in private and public international law, and was the first jurist to attempt to systematise the branch of the law known variously as private international law and 'conflict of laws.' Consult his *Private International Law*, 1858 (re-written 1880). His *Chapters on the Principles of International Law*, 1891, and *International Law*, 1904-07, are his most important works. He was a member of The Hague International Court of Arbitration (1900-06), and was a strong adherent of settlement of international disputes by arbitration. See *The Collected Papers of John Westlake on Public International Law*, 1914. Died April 14.

Westland, western coast prov., South Is., New Zealand, lying between the Southern Alps and the Pacific Ocean, and between Grey R. in the N. and Big Bay in the S. Area 4880 sq. m. There are gold deposits and some coal. Chief tns., Greymouth and Hokitika. Pop. 15,100.

Westmeath, an inland co., prov. Leinster, I.F.S., bounded N. by Cavan, S. by King's co., E. by Meath, and W. by Roscommon. The surface is varied and is some 250 ft. above sea-level; it is a co. of loughs, and contains some very fine scenery. The largest of these is Lough Ree on the Shannon, others include Lough Sheelin and Lough Kinale. There are no great elevations, the greatest heights being Knocklayde (795 ft.) and Hill of Ben (710 ft.). The principal rivs. are the Shannon, the Inny, and the Boyne, with their tributaries. The Royal Canal cuts through the county, affording easy communication with Dublin. Agriculture is the staple industry and dairy farming is largely carried on. Some friezes and coarse woollen materials are manufactured. The loughs are famous for their trout fishing. The chief tns. are Athlone and Mullingar, the co. tn. The counties of W. and Longford return five members to Dail Eireann. The co. contains a number of interesting encampments, and the ruins of Multifarnham Abbey (1236) are noteworthy on account of the tower, which is 93 ft. high. The area of the co. is 708 sq. m. Pop. (1926) 56,796.

Westminster, City of, the largest of the twenty-eight boroughs which together constitute the British metropolis, is also, perhaps, the most important, for it contains the royal residence, the houses of the legislature, the supreme courts of law, the chief public offices of the executive gov., and the magnificent abbey church of St. Peter, in which some of the noblest and greatest of English-

men have been interred. The city appears to have owed its origin to a church erected here by the Saxon king Sebert (or Sæbyrht) and dedicated to St. Peter. Sebert died about 616. This church appears to have been destroyed by the Danes about the time of Alfred, but it was rebuilt by Dunstan in the reign of Edgar and established about 958 as a Benedictine abbey. In the reign of Edward the Confessor W. was the residence of royalty, and Edward's palace seems to have been on or near the site of the present Houses of Parliament. This monarch rebuilt the abbey church with great magnificence, and, on his decease, was interred within its walls. After the Conquest, Westminster continued to be the usual residence of the kings of England, and in the abbey church of St. Peter they were usually crowned. William Rufus built a hall as a banqueting-room to the palace, and this, restored by Richard I., is the present W. Hall. Henry III. began to rebuild the abbey church of St. Peter, having caused the anct. edifice of Edward the Confessor to be pulled down in 1245. He had previously built a new Lady Chapel. This chapel was replaced by the more extensive and costly structure now known as Henry VII.'s chapel. This was the last important alteration or addition made to the abbey until late in the seventeenth century, when the W. towers were rebuilt under the direction of Sir Christopher Wren. Since that time much renovation has been carried out, but no additions have been made. The extreme length of the abbey is 530 ft. 9 in. The extreme breadth is 220 ft., the length of the nave is 154 ft., and its height 105 ft. The height of the towers is 225 ft. Westminster School or St. Peter's College, the existence of which is historically recorded since 1339, was then a Grammar School attached to the Collegiate Church of St. Peter, W. Queen Elizabeth re-founded the school in 1561. In 1868 the school's legal connection with the Abbey was severed. The School has now some 370 scholars. The city has an area of 2503 acs. Pop. (1931) 129,535.

Westminster, Dukes of. The first to hold this title was Hugh Lupus Grosvenor (1825-99), who was created Duke of W. in 1874. He was the grandson of Robert Grosvenor, 2nd Earl Grosvenor (1767-1845), upon whom the title of Marquess of Westminster was bestowed in 1831. The present holder of the title is Hugh Richard Arthur Grosvenor (b. 1879), the grandson of the first Duke and the son of Victor Alexander, Earl Grosvenor. The family is descended

from the Grosvenors of Eaton, near Chester, and traces its origin back to the Conquest.

Westminster, Statute of (1931), Eng. Act of Parliament, received the Royal Assent on Dec. 11, 1931. The purpose of this statute was to give extra-territorial operation to the legislation of the British Oversea Dominions and to repeal those provisions of the Colonial Laws Validity Act, 1865, which were no longer in harmony with modern practice. The chief provisions of this statute will be found under COLONIAL LAW. For earlier Statutes of Westminster see DE DONTIS CONDITIONALIBUS and QUIA EMPTORES.

Westminster Assembly of Divines, a Puritan assembly, which sat from Aug. 1643 to Feb. 1649, in order 'to confer and treat among themselves of such matters and things touching and concerning the Liturgy, discipline and gov. of the Church of England, or the vindicating and clearing of the doctrine of the same.' On April 20, 1644, it submitted to parliament its *Directory for Public Worship*, while the first part of its *Confession of Faith* was presented in Oct. 1644. Both these documents and the Shorter and Larger Catechisms were ratified and approved by the General Assembly of the Church of Scotland, and still remain the authorised standards of that establishment. The Assembly also attempted to set up a Presbyterian system of church gov. in England, but all its work was swept away at the Restoration.

Westminster Bank, one of the leading five banks or banking amalgamations of the United Kingdom, established originally, in 1834, as the London and Westminster Bank and amalgamated with the London and County Banking Company (established in 1836) in 1909 under the name of the London County and Westminster Bank. Acquired Parr's Bank (established 1865) in 1918, the Nottingham and Nottinghamshire Banking Company in 1919, Beckett and Company, of Leeds and York, in 1921, and later the Guernsey Commercial Banking Company, Stillwell and Sons, besides a large share of the capital of the Bank of British West Africa. Affiliated banks are the Westminster Foreign Bank and the Ulster Bank. The authorised share capital of the W. B. is £33,000,000; subscribed, £30,533,127; paid-up, £9,320,157. It has an authorised note issue in the Isle of Man for £25,000. Its reserve at December 1930 was £9,320,157; current, deposit and other accounts, £283,252,088. See also BANKS AND BANKING.

'Westminster Gazette,' a former London Liberal evening daily paper, established in 1892 by George Newnes (q.v.) and remarkable for being printed on pale green paper. Its outstanding features were the strong front-page articles on the political issue of the day; the cartoons of 'F.C.G.' (see GOULD, FRANCIS CARRUTHERS), and the reviews in the Saturday edition of literature, fine arts, and other matters of current interest. Edward Tyas Cook was its first editor, but retired after a few years in favour of Mr. J. A. Spender, one of the leading Liberal political writers of the day. Later the paper came under the control of the Brunner-Mond interests, but, notwithstanding their great influence, its fortunes after the Great War shared those of the ill-fated Liberal party, and after a short existence as a morning paper it ceased publication.

Westmorland, a northern co. of England, bounded on the N.W. by Cumberland, S. and W. by Lancashire, and E. by Yorkshire. W. comprises a considerable part of what is known as the fell country and also of the Lake Dist. The mountainous region, with its great tracts of moorland, affords some magnificent scenery and includes the heights of Crossfell (3000 ft.), Milbourne Forest (2780 ft.), Helvellyn (3118 ft.), and many others; while the lakes include Windermere, Ullswater (in part), Grasmere, and Hawes Water. The principal rivs. are the Eden, running through what is known as the Vale of Eden, the Lune, and the Kent. Throughout the Lake Dist. there are crags and scars and also a number of beautiful waterfalls. The climate is for the most part cold and wet, and only about half of the co. is under cultivation, and of this the greater part is devoted to pasturage, sheep and cattle being raised in large numbers. Oats is the main crop; granite, slate, and limestone are quarried and lead is found. The manufs. are unimportant, and include woollen goods, paper, and bobbin making. The principal tns. are Appleby, the co. tn., and Kendal; the co. returns one member to parliament. There are anct. castles at Appleby, Brough, and other places, and the ruins of Shap Abbey. W. suffered from the invasions of the Scots in anct. times, Appleby being twice sacked and burnt. During the Civil War the co. was royalist, but later espoused the Jacobite cause. The area is 790 sq. m. Pop. (1931) 65,400.

West New York, a tn. in Hudson co., New Jersey, U.S.A., connected by ferry with New York. Its chief

manufs. are silk, sugar, cotton-seed oil, and rubber. Pop. 37,107.

Weston-super-Mare, a watering-place of Somersetshire, England, on the Bristol Channel, at the foot of Worlebury Hill, 18½ m. S.W. of Bristol. The tn. has a fine esplanade and public gardens, potteries, mineral springs, and fisheries. Pop. (1931) 28,600.

West Orange, a tn. of Essex co., New Jersey, U.S.A., adjoining Orange co., and 13 m. W. of New York City. It was chartered as a tn. in 1900. There are phonograph, lawn-mower, and felt-hat manufs. Pop. 24,327.

Westphalia, a prov. of Prussia, bounded on the N. by Hanover, on the E. by Schaumburg-Lippe, Hanover, Lippe-Detmold, Brunswick, Hesse-Nassau and Waldeck, on the S. and S.W. by Hesse-Nassau and the Rhine Province, and on the N.W. by the Netherlands. It has an area of 7801 sq. m. and a length and breadth of about 180 m. The S. of the prov. is mountainous, being diversified by the Schiefergebirge and the hills of Sauerland, and farther N. occur the Erzegebirge and the Teutoburger Wald, on each side of which lie portions of the great plain of N. Germany. On the S.W. is the wide 'bay' of Münster, and on the N.E. the valleys of the Weser and the Werre. Other rivs. are the Ems, Lippe, Ruhr, Sieg, Eder, and Vechte. The climate is temperate except in the S., which is cold in winter and has a heavy rainfall. Flax is extensively grown, in addition to grain of all kinds, fruit, hemp, potatoes, peas, and beans, and swine are reared in large numbers for Westphalian hams. The breeding of horses is also carried on and the rearing of cattle and goats is important. But the wealth of the prov. lies in its minerals, of which the chief are coal and iron; the former being found in the great Ruhr coalfield, which extends from the Rhineland into the prov. as far as Unna, the centre being Dortmund, and there is a smaller coalfield in the N. at Ibbenbüren, the latter occurring in the Schiefergebirge and the Ruhr coalfield. Besides these, zinc, lead, copper, antimony, quicksilver, stone, marble, slate, and potter's clay are also worked, and there are brine springs in the Hellweg, and mineral springs at Erhwelm, Lippspringe, Oeynhausen, and Driburg. Manufactures are extensively carried on, notably iron and steel, brass and bronze, tin and Britannia metal, and needles at Dortmund, Hagen, Bochum, Altena, Iserlohn, and Lüdenscheid; linen at Bielefeld, Herford, Minden, and Warendorf; jute at Bielefeld; paper on the lower Lenno;

leather around Siegen; cotton goods in the W. Other manufactures are chemicals, glass, sugar, sausages, and cigars. Trade is facilitated by the Weser, Ems, Ruhr, and Lippe, which are navigable, and the prov. is also well equipped with good roads and railways. W. is divided into three administrative divisions, Münster, Minden, and Arnberg, and has Münster for its cap. The prov. was constituted in 1815. Pop. 4,784,000.

West Point Military Academy. The U.S. Military Academy is situated at West Point, in the state of New York. The massive buildings rising from an elevated plain are modelled in the style of mediæval castles. West Point was first occupied as a military post on Jan. 20, 1778, and its occupation has been continuous since that date. Its early history is inseparably linked with that of the U.S.A., as it formed one of the more important fortified places held by the continental troops during the Revolutionary War. The grade of 'Cadet' was authorised for the American army by an Act of Congress approved May 9, 1794, which authorised the organisation of a corps of artilleryists and engineers with two cadets to a company. A school for this corps and the cadets attached thereto was established on the recommendation of Washington, by order, at West Point in 1794. The destruction of its buildings by fire in 1796 caused its suspension. The school was reopened in July 1801. An Act of Congress, approved March 16, 1802, provided for a further reorganisation of the school, and a formal opening occurred on July 4 of that year with ten cadets present. This Act designated the school as the 'Military Academy' and provided that it should be located at West Point. Since that date the Academy has steadily grown in size and importance until it is now regarded as one of the best military schools in existence. As at present constituted the corps consists of 1374 cadets, selected from all parts of the U.S.A. Provision is made for the appointment of a certain quota from among enlisted men of the Regular Army and of the National Guard, as well as from among residents of each Congressional dist. and from each state at large. As a result the personnel of the school represents a perfect cross-section of the youth of the entire country, thus ensuring a truly representative group and a democratic organisation. The supervision and charge of the Academy are, by statute, vested in the Secretary of War under such officer or officers as he may assign to that duty.

At the present time the chief of staff is, by direction of the Secretary of War, charged with the supervision of matters in the War Department pertaining to the Academy. With one or two exceptions the theoretical and practical instruction of the cadets is carried on by commissioned officers, aided by detachments of enlisted men from the several arms and services. The military personnel at the Academy and the military post of West Point averages about 200 officers and 1200 enlisted men. From 1919 to 1926 the superintendent held the rank of brigadier-general, and since the last-mentioned date that of major-general. Cadets are appointed between the ages of seventeen and twenty-two years (or nineteen and twenty-two years if selected from the army or the National Guard); are required to undergo a rigid physical examination and mental tests equivalent to those usually prescribed for entrance into similar institutions of college grade. The course of study is four years, and upon graduation cadets are commissioned as second-lieutenants in the Regular Army. The pay of a cadet is \$780.00 per year and commutation of rations at 80 cents a day, a total of \$1,072.00 per year. The total number of graduates, including a few foreigners receiving instruction under special Acts of Congress, from 1802 to June 12, 1931, inclusive, is 9323.

Westport: (1) A seaport in Clew Bay, Mayo co., I.F.S., 12 m. S.W. of Castlebar; connected by steamer with Glasgow and Liverpool. W. is a market tn. The chief industry is agriculture. Pop. (1931) 3700. (2) A tn. on the W. coast of South Is., New Zealand. It has a fine harbour and is a shipping port for coal and gold. Pop. 5500.

West Prussia, a prov. formerly of Prussia, situated in the N.E. of the kingdom, with an area of 9862 sq. m. By the Treaty of Versailles the greater part of the prov. was ceded to Poland; some dists., on the plebiscite being taken, remained Ger. (area 2978 sq. m.). It is bounded on the N. by the Baltic, S. by Poland and the prov. of Posen, E. by the Polish corridor separating it from E. Prussia, and W. by the provs. of Brandenburg and Pomerania. Agriculture is the chief industry, but there are many manufs. Pop. 332,000.

West Riding Regiment (The Duke of Wellington's Regiment (West Riding)). Formerly 33rd and 76th Foot. 33rd raised 1702 and served in various campaigns in Spain, Flanders, and at Dettingen. The future Duke of Wellington com-

manded the regiment in 1794-95 and was later its colonel. It served under him at Waterloo. At his death in 1852 the regiment was given the title 'Duke of Wellington's' and granted his crest and motto as a badge. It also served in the Crimea. 76th raised 1787 and served with great distinction in India, at Seringapatam, Allyghur, Leswarree, and Deig. Later went to the Peninsula and afterwards Canada. Regiments were linked in 1881, and gained honours in S. African War, 1894-1902. During the Great War raised twenty-one battalions which served in France, Flanders, Italy, Gallipoli, and Egypt.

West Virginia, one of the United States, separated from Virginia in 1861. It has an area of 24,170 sq. m., and is bounded on the N.E. by Pennsylvania and Maryland, on the S. and E. by Virginia, and W. by Kentucky and Ohio. It is about 240 m. long from N. to S. and 160 m. broad. The Ohio R. forms the N. boundary of the state and many of its tributaries flow through it. The Potomac forms part of the N.E. boundary, while the Alleghany and Shenandoah Mts. border the S.E. The climate is agreeable and healthy. About two-thirds of the soil is covered with forest. The soil is fertile, and many of the mountains are topped with flat meadows. Agriculture employs most of the pop., the chief crops being Indian corn, wheat, oats, rye, buckwheat, potatoes, hay, and tobacco. The chief fruits grown are grapes, apples, peaches, and pears. Flour milling is also carried on, and there are manufs. of lumber and timber, iron and steel goods, glass, slaughtering and meat-packing, petroleum refining, leather, zinc, melting and refining, pottery, coke, foundry and machine-shop products, and many others. The state ranked fifth in the value of minerals produced in 1927. Most of the rocks in the state are carboniferous, and yield coal extensively over large areas. Other minerals are natural gas, petroleum, and clay products, as well as smaller quantities of stone, lime, sand, gravel, and iron ore. The state cap. is Charleston, but the largest and most important city is Wheeling, where most of the important industries, except salt manufacture, are located. W. V. is a rapidly developing state, and transport facilities are rapidly being extended, and during the last ten years 1200 m. of new railroad have been laid. Over 99 per cent. of the farms are owned by white people, and less than one per cent. by negroes. Most of them are worked by their owners, and average over 100 acs. in size. Pop. (1930)

1,729,200. See J. M. Callahan, *New History of West Virginia*, 1922; V. A. Lewis, *West Virginia, its History*, etc., 1904.

West Virginia University, an institution for the higher education of men and women, founded at Morgantown, W. Virginia, in 1867. Has an enrolment of about 2700 students, a faculty of over 300, and a library of over 92,000 volumes. The establishment of a graduate school and the extension of research are among the developments of the university since 1929.

Westward Ho! a seaside resort of Devonshire, England, on Bideford Bay, 2½ m. N.W. of Bideford. It takes its name from Charles Kingsley's novel. It has a military college (founded 1874) and famous golf-links on Brautoun Burrows.

Wet, De, and Wette, De, see DE WET and DE WETTE.

Wetherby, a market tn. of the W. Riding of Yorkshire, England, on the Wharfe, 6 m. S.E. of Harrogate; has brewing industries and a cattle market. Pop. 16,500.

Wetter, Lake, see VETTER.

Wetterhorn, a mountain in the Bernese Oberland, Switzerland, E. of Grindelwald, about 12 m. from Interlaken. It consists of three peaks, of which the middle, or Mittelhorn, is the highest (12,166 ft.). The other two are known as the Hasli Jungfrau (12,149 ft.) and the Rosenhorn (12,110 ft.). The mountain was ascended first in 1844, and frequently since, the ascent being made from Grindelwald. The neighbourhood of the Wetterhorn is particularly attractive to artists, the contrast between the bright pastures and the black precipices and dazzling snow ridges being remarkably striking.

Wettin, House of, a Ger. reigning family dating from about the mid-tenth century. It has given rise to several European royal houses. Ernest I. (1784-1844), who first assumed the title of 'Saxe-Coburg-Gotha' (c. 1826), was a descendant. Dedo I. (d. 1009), son of Dietrich (d. 982), first gained possession of the co. of W. His son, Dietrich II., married a daughter of the Margrave of Meissen. Under their grandson, Henry I. (d. 1103), the importance and extent of the dominions of the H. of W. increased greatly, lower Lusatia and the mark of Meissen being recognised as possessions. Naumberg became their cap. Conrad I. and his descendants were rulers from 1123 to 1288, when W. co. and castle near the Saale were sold to the Archbishop of Magdeburg. He retained them till the Peace of Westphalia (1648); the Elector of

Brandenburg then claimed them, and they were finally annexed to Prussia (Saxony).

Wetzlar, a tn. of Rhine prov., Prussia, at the confluence of the Dill and Lahn, 64 m. N.E. of Coblenz by rail; has iron mines, foundries, and manufs. of gloves and optical instruments. Goethe wrote here the *Sorrows of Werther*, 1772. Pop. 16,700.

Wexford: (1) A maritime co., prov. Leinster, I.F.S., bounded on the N. by Wicklow, S. and E. by St. George's Channel, W. by Waterford and Kilkenny. The surface is hilly in the N. and W., the greatest heights being reached in Mt. Leinster (2610 ft.) and Blackstairs Mt. (2409 ft.). Owing to sandbanks the coast is dangerous, and the only opening of importance is Wexford Harbour and Bay, while Waterford Harbour divides it from the co. of that name in the S. Off the coast to the S.E. is Tusker Rock with a lighthouse, and further S. are the Saltee Is., beyond which there is a lightship. The principal rivs. are the Barrow and the Slaney, both navigable for a long distance. Agriculture is successfully carried on, and sheep and cattle are reared in increasing numbers. Barley is the main crop, the fisheries are important, and some marble is quarried. The principal tns. are Wexford (the co. tn.), New Ross, and Enniscorthy. The co. returns five members to Dail Eireann. There are a number of fine old ruins in the co., including Dunbrody Abbey, Ferns Abbey, and the castles at Ferns and Enniscorthy. The area is 901 sq. m. Pop. 102,300. (2) A mun. bor. and seaport, cap. of co. Wexford, I.F.S., on the R. Slaney. Its importance is mainly on account of the harbour, which is formed by the estuary of the riv., but owing to a bar across the mouth big vessels are unable to enter at ebb tide, and in consequence the harbour of Rosslare was built and connected by rail with W. (8 m.). The tn. contains the ruins of St. Sepulchre's Abbey and some fragments of the old tn. walls, and the barracks are on the site of an anct. castle; there are also some good modern buildings. The chief industries are shipbuilding and cement, and there are breweries, tanneries, and distilleries; artificial manure, rope, and agricultural implements are manufactured, and the tn. is the centre of important fisheries. The town was besieged by Cromwell in 1649, garrisoned by William III., 1690, and was the headquarters of the rebellion of 1798. It received its first charter in 1318. Pop. 11,600.

Wey, a riv. of Hampshire and Surrey, England, rises near Alton in Hampshire, and flows N.E. past

Godalming and Guildford to join the Thames at Weybridge. Length 35 m.

Weybridge, an urban dist., Surrey, England, at the junction of the Wey and the Thames. W. is mainly a residential tn. The Brooklands racing track for motors and aeroplanes was opened here in 1907. Pop. (1931) 7400.

Weyburn, a tn. in Southern Saskatchewan, Canada, which of recent years has grown considerably as a commercial and industrial centre, being on the main route from the United States into Western Canada. In 1912 the municipality voted for the expenditure of \$285,000 for new public buildings. The Cleveland Manufacturing Company have large works here in which they employ 200 men in the manuf. of petrol engines, stoves, etc. W. is the headquarters of a new land dist. (5148 sq. m.) organised by the Dominion gov. in 1912. Pop. (1930) 3200.

Weyden, Rogier van der (1400-64), a Flemish painter, b. at Tournai. He became tn. painter at Brussels (1435). Among his best-known works are the 'Magi' triptych (1450), 'The Crucifixion', 'Expulsion from Paradise', and 'The Last Judgment' (Prado Gallery), several Madonnas, and 'St. John the Baptist' (Frankfort). See Life by Hasse (1905).

Weygand, Maxime, Belgian-Fr. general; b. Jan. 12, 1867, at Brussels. Military education began at St. Cyr, 1885. Entered cavalry, 1888. Made Chief of Staff to Foch, Sept. 1914. General of Brigade, 1916. Fr. representative, Inter-Allied General Staff, 1917. In Aug. 1920 was in Poland: reorganised Polish army, which under him defeated Russians in Dec. Then appointed to Conseil Supérieur de la Guerre. Military expert, Fr. delegation, Lausanne, 1922. High Commissioner, Syria, 1923-24. Next, in charge of Centre des Etudes Militaires. Again Chief of General Staff, Jan. 1930. Vice-president, Supreme War Council, and Inspector-General of Army, Feb. 1931. Elected member of Academy, June 1931. His book, *Turenne*, appeared 1929.

Weyman, Stanley John (1855-1928), Eng. novelist; b. Aug. 7, at Ludlow, Salop; second son of Thomas W., solicitor. Educated: Shrewsbury; Christ Church, Oxford. Called to Bar, Inner Temple, 1881; practised about eight years. His novels are nearly all historical; and in this vein he was specially popular. Titles include: *The House of the Wolf*, 1890; *A Gentleman of France*, 1893; *Under the Red Robe*, 1894; *My Lady Rotha*, 1894; *Memoirs of a Minister of France*,

1895; *The Red Cockade*, 1895; *Shrewsbury*, 1897; *The Castle Inn*, 1898; *Sophia*, 1900; *Count Hannibal*, 1901; *The Long Night*, 1903; *Chip-pinge*, 1906; *The Abbess of Flaye*, 1904; *Starvecrow Farm*, 1904; *The Wild Geese*, 1908; *The Great House*, 1919; *Ovington's Bank*, 1922; *The Traveller in the Fur Cloak*, 1925; *Queen's Folly*, 1925; *The Lively Peggy*, 1928.

Weymouth and Melcombe Regis: (1) A seaport watering-place, market-t., and mun. bor., Dorsetshire, England, at the mouth of the Wey. W. and M. R., on opposite banks of the riv., are connected by bridges. Weymouth Bay is shut in on the S. by the Isle of Portland. The chief industries are the quarrying of Portland stone, shipbuilding, sail and rope-making, brewing, and fishing. Pop. (1931) 22,000. (2) A township, Norfolk co., Massachusetts, U.S.A., manufs. boots and shoes, nails, portable houses and garages. Pop. (1930) 20,900.

Weyssenhoff, Joseph, b. 1860 in the village of Kolano in Poland, is a lawyer by profession and an author by avocation. He differs from most of the Polish writers in that his best books sparkle with fun, humour, sarcasm and irony. This is especially true of one which is famous in Poland and has also been translated into French—*The Life and Opinions of Sigismond Podfilipski*. The round of life of the well-to-do Polish idler, whom the fate of his country troubles little, gives the writer ample scope. He continued the same sprightly vein in his *Political Days*.

Whale, the name for most of the members of the order Cetacea, which are eagerly hunted for the oil, whalebone, spermaceti, ivory, etc., which they yield. Ws. are the most thoroughly aquatic of all mammals, the forelimbs being reduced to fin-like paddles and all external traces of the hind limbs having virtually disappeared. They occur in all seas and by loose attachment of the ribs are able to expand the chest and remain a long time under water. When they rise to the surface, the heated air expelled condenses and forms a column of spray. The whalebone Ws. still develop rudimentary teeth before birth, but then these are displaced by a large number of flattened plates of bone or baleen fringed at the edges, which strain the food from the water. Whalebone is derived principally from the Right W., and, being strong, light, and flexible, has many uses. Most Ws. are inoffensive creatures and swim in herds. Whalebone is absent from the toothed Cetaceans, which include not only the

dolphin, porpoise, and narwhal, but also the cachalot, or sperm W., the bottle-nose, and beaked Ws.

Whale Fisheries are of ant. origin, the Norwegians and the Basques having sought the valuable whalebone and oil-producing mammals as early as the ninth century; the Norwegians are still foremost in this industry. In modern times whale fishing has become so profitable commercially that the W., a slow-breeding animal, is in danger of total extinction, and restrictions have to be imposed on the numbers killed. (See **DISCOVERY COMMITTEE**.) Practically the whole of the animal is utilised in one form or another: the oil as a lubricant, or for making soap, candles, and margarine; the whalebone is employed by corset manufacturers and in the brush trade; the prepared flesh is used as a cattle-food; the flesh and ground bones as soil fertilisers; ambergris, an intestinal exudation of diseased sperm Ws., is a valuable ingredient in the manufacture of perfumes. In 1870 Sven Foyn, a Norwegian, invented the shot-harpoon which revolutionised whale-fishing and made it more humane, the harpoon being shot from a gun into a vital part of the sea-monster. W. Fs. are carried on near the coasts of Greenland and Newfoundland, but those of several dependencies of the Falkland Islands, viz. S. Georgia, S. Orkneys, S. Shetlands, and S. Sandwich, yield a greater return than the whole of the rest of the industry. *The Cruise of the Cachalot* (1906), by Frank T. Bullen, is a fascinating description of whaling; two recent books are: *Whaling in the Antarctic*, by A. G. Bennett, 1931; and *Whaling in the Frozen South*, by Alan G. Villiers, 1931.

Wharfe, a riv., W. Riding of Yorkshire, England, rises on Cam Fell, and flows S.E. to join the Ouse near Cawood. Length 60 m.

Wharton, Mrs. Edith, American novelist, b. in New York City, 1862, and married a Boston banker, Edward Wharton, in 1885. Educated largely at home, she has travelled extensively, living most of her later years in France. In her literary work she started out as a disciple of Henry James, but as she developed she retained from him merely some of his technique in the analysis of character. Born into such aristocracy as New York has, she maintained the aristocratic outlook. Her methods are largely those of satire, particularly of the very class from which she sprang. Unlike James, her best books deal with American scenes and people, particularly the fate of those who defy the conventions of the class into which

they were born. Her masterpiece, one of the best things in modern American literature, is *Ethan Frome*, 1911, a stark, stripped story of New England, worthy of Hawthorne. She impinged upon general public notice with her *House of Mirth* in 1905. Other successes have been *The Age of Innocence*, *The Children*, *Old New York* and *Hudson River Bracketed*.

Wharton, Philip Wharton, Duke of (1698-1731), the only son of Thomas, Marquess of Wharton. Philip went abroad in 1716 and vowed allegiance to the Pretender, who created him Duke of Northumberland and gave him the Garter. In the following year he returned to England, and submitted to George I., who created him Duke of Wharton. He opposed the attainder of Atterbury (1723) and shortly after again joined the Pretender, and later entered the Spanish service and fought before Gibraltar. Biography by Lewis Melville (1913).

Wharton, Thomas Wharton, Marquess of (1640-1715), an Eng. statesman, was a prominent supporter of the Revolution of 1688. He is the reputed author of *Lilli Burlero* or *Lilli-bullero* (q.v.). He was a commissioner for the union with Scotland, 1706, and in that year was given an earldom. He was Lord-Lieutenant of Ireland from 1708-10, when Addison was his secretary. He was one of those who proclaimed George I. as King of England, and was rewarded with a marquissate.

Whately, Richard (1787-1863), an archbishop of Dublin, b. in London and educated at Bristol and Oxford, becoming a fellow of Oriel College. He was one of the founders of the Broad Church School, and favoured unsectarian religious education. Among his works are: *Christian Evidences*, *Peculiarities of the Christian Religion*, *The Kingdom of Christ*, *Logic and Rhetoric*. See Jane Whately. *Life and Correspondence*.

Wheat, or *Triticum*, a grass, the origin of which has not been definitely established. There are many hundreds of forms in cultivation, and authorities classify them as varieties or sub-varieties of the three following species: one-grained W. (*T. monococcum*), which possesses a flat, short, compact ear; the two flowers of the spikelets produce only a single ripe grain. It is sometimes cultivated on poor soils, in mountainous dists. of Central Europe. Polish W. (*T. Polonicum*) has awned glumes, which enclose all the flowers in the spikelet, only two of which are fertile. The grain is large and very hard; the crop is grown in Southern Europe, but is unsuited to British climate. *T. sativum* is divided into three races: (1) Ordinary spelt Ws.,

grown on poor soils, in Central Europe; (2) Two-grained spelt Ws., grown in S. Europe chiefly for the manuf. of starch; (3) *T. sativum tenax*, which has given rise to all the most important varieties, classified in four sub-races, each of which is commonly regarded as a separate species. Hard or flint W. (*T. durum*) is grown around the Mediterranean chiefly for making macaroni. Turgid or rivet W. (*T. turgidum*) produces red grain with very tall stiff straw, used for thatching purposes. The grain makes dark coloured flour, and is too poor in gluten for bread-making. Dwarf Ws. have short stiff straw with small grains. Common W. (*T. vulgare*) includes all the more important varieties grown in the great W. dists. Winter Ws. are sown in autumn, and spring varieties usually in February. The average yield per ac. in different parts of the world is shown in the following table and is taken from the *International Year Book of Agricultural Statistics*. Cases of low average are due to varying causes. In Australia there is a scanty rainfall, e.g. it is only 9 in. in the growing regions of Western Australia, but the abounding sunshine results in superior quality. In Russia the low average is due to the backward state of the industry, but a rapid increase is expected as a result of present-day activity in that country. In Argentina droughts, floods, frosts, and locusts seriously interfere with a regular W. yield.

Country.	Bushels per acre
Denmark . . .	44
United Kingdom . . .	32
Germany . . .	25
France . . .	20
Holland . . .	39
Russia (European) . . .	10
India . . .	12
U.S.A. . .	14
Canada . . .	13
Australia . . .	12

The great W.-importing countries are in the W. of Europe where the pop. is largely industrial, the United Kingdom standing at the head of the list. The acreage and production of W. in some of the British countries are shown in the following table, taken from the *Statistical Abstract* for the British Empire, 1931.

	Acreage under wheat.	Produc- tion (1000 bushels).
United King- dom . . .	1,384,556	49,765
Canada . . .	25,225,002	299,520
Irish Free State . . .	28,583	1,184

	Acreage under wheat.	Produc- tion (1000 bushels).
Northern Rhodesia	2,299	32
Anglo-Egyptian Sudan	25,502	365
Australia	14,976,564	126,885
New Zealand	235,942	7,240
Union of South Africa	824,669	7,238
India	31,348,000	386,512
Southern Rhodesia	4,886	45
Kenya	63,217	978

Great Britain imports W. from the great W.-producing areas in the following proportion, the figure representing percentage of total import.

	Per cent.
U.S.A.	28.5
Argentine Republic	14.1
Canada	35.3
India	5.6
Australia	12.0

Exports of W. from the Dominions are shown in the following table :

	Exports (1000 tons).	Production (1000 tons).
Canada	4,741	8,157
Australia	1,085	3,388
India	13	10,353

World Production (1920-30).—Since 1920 total world production (omitting Russia and China) has increased in each year, except in 1924 and 1929 when the crops were 403 million and 476 million bushels less than in the years immediately preceding. But both of these crops followed years of bumper harvests. The crops of 1923 and 1928 were the highest reached at their respective dates—3509 millions in 1923 and 3886 millions in 1928. During the decade 1920-30, Europe (outside Russia) regained its pre-war production. On the Continent production has somewhat increased; but in Great Britain, since 1924, the crop has been below its pre-war average, and has been steadily falling. Continental Europe was able to maintain its pre-war production in 1929 and 1930 only by the aid of a variety of protective measures. Except in 1921 and 1928 when the harvests were poor, production in India has fluctuated during the decade within ten per cent. either way of the pre-war average. The increase in the chief non-European countries has taken

place almost entirely in four countries: Canada, the U.S.A., Argentina and Australia. These were the countries which before the Great War were tending to supply more and more the increasing deficiency in Europe (outside Russia); during the Great War the demands upon them were increased; and, as might have been expected, the greatest increase in production, both absolute and relative, took place in these countries.

Recent and Pre-War Production in Four Principal Wheat-exporting Countries, outside Europe.

	Millions of bushels	
	Average 1909-13.	Average four years 1927-30.
Canada	197	437
U.S.A.	690	863
Argentina.	147	250
Australia	91	155
Total	1,125	1,705

In 1927 and 1928 the combined harvests in the U.S.A., Canada, and Argentina exceeded the harvests in any other year in the decade by 121 million and 269 million bushels respectively. As a result of these two harvests the stocks held in the U.S.A. and Canada were more than doubled. These two big harvests were followed by smaller crops in 1929, due to poor harvests rather than to reduced acreage. In Australia also the crop was 33 million bushels below the heavy crop of 1928, but in Europe, the 1929 harvest was good, particularly in France, Italy and Great Britain. Wheat prices moved downwards in close harmony with those of general commodities, and in spite of the smaller 1929 crop in the large wheat-producing countries outside Europe, visible stocks increased very considerably by the end of the crop year. Finally, in the year 1930 world production again increased above the level of 1927 though it did not reach that of 1928. The largest increase was in Argentina, due both to a sharp rise in yield and a considerable extension in acreage. In Canada, India and the U.S.A. the increase was due to better yields. In Australia the crop was the largest ever harvested, chiefly because the acreage was the largest sown in any post-war year. In Europe the 1930 crop was below that of 1929; but German production increased by

8 million bushels, and among Danubian countries, Rumania and Bulgaria both had record yields. These changes, however, became relatively insignificant in comparison with the unprecedented increase in production reported to have taken place in Soviet Russia. Prior to the Great War, Russian production had been increasing rapidly. The increase actually shown in the official statistics may have resulted partly from changes in the method of preparing the estimates, but there can be little doubt as to the general trend, and no doubt at all that after satisfying domestic requirements there remained an exportable surplus which seldom fell below 100 million bushels. Since the Great War, until 1930 Russia has in no year except 1926-27 exported an important quantity of wheat and in one or two years has actually imported. No statistics of production in post-war years before 1922 are available. Statistics published by the International Institute of Agriculture for subsequent years show a resumption of the upward movement in production as follows:—

Production in Russia (millions of bushels).

Average of 1909-13 . . .	758
1923 . . .	703
Average of 1924 and 1928 . . .	747
1929 . . .	703
1930 . . .	1,084

i.e. 380 million bushels in excess of average pre-war production—a quantity comparable with the total Canadian crop of 1930. See *The Wheat Situation, 1931*; *Twentieth Report of the Imperial Economic Committee*, H.M. Stationery Office, 1932.

To remedy the serious situation of agriculture in the United Kingdom, a Wheat Bill was introduced in 1932, the object of which was to provide wheat growers in the United Kingdom with a secure market and an enhanced price for home-grown wheat of millable quality without a subsidy from the exchequer and without encouraging an extension of wheat cultivation of land unsuitable for the crop. A quota for Dominion wheat in consideration of increased markets in the Dominions for United Kingdom manufactures is to be considered at the Imperial Economic Conference at Ottawa in June 1932.

For diseases see BUNT, HESSIAN FLY, RUST and SMUT. See also FLOUR, and Professor Percival, *Agricultural Botany*; Brettell, *Social and Economic Geography*, 1931; Chisholm, *Handbook of Commercial Geography*, 1928;

and *Statistical Abstract of British and Foreign Trade and Industry*, 1931.

Wheatear, Fallow Chat, Fallow Finch, or *Saxicola cenanthe*, a summer migrant to Britain, often arriving in February. It is about 6 in. long, grey on the upper parts with a black streak from beak to ear and with black quill feathers, wing coverts, and tail feathers. In flight a white patch on the lower back and tail is conspicuous. The underparts are white with a buff tinge on the breast. Its food consists chiefly of insects, and towards the end of the summer the birds, which are then plump and in good condition for the migration, are snared in considerable numbers for the table.

Wheat Fly, see HESSIAN FLY.

Wheatley, Henry Benjamin (1839-1917), an Eng. antiquary. Among his writings are: *London Past and Present*; *London, in the Mediaeval Town Series*; *Round about Piccadilly and Pall Mall*; and *Hogarth's London*. For a time a clerk in the Royal Society and later assistant-secretary of the Society of Arts, and editor of that society's *Journal*, 1879-1908. Hon. sec. of the Early English Text Society and prior of the Johnson Club; founder of the Pepys Club; vice-president of the London Topographical Society; chairman of the Council of the Shakespeare Association, and a fellow of the Society of Antiquaries.

Wheaton, Henry (1785-1848), an American jurist, b. at Providence, Rhode Is. He was editor of the *National Advocate* in New York, presided there as justice of the marine court, was reporter for the United States Supreme Court, chargé d'affaires at Copenhagen (1827-35), and minister at Berlin (1835-46). His chief work is: *Elements of International Law*; others are: *Life of Will. Pinkney*, *Hist. of the Northernmen*, and *Hist. of the Law of Nations*, etc.

Wheel, Breaking on the, a cruel punishment, formerly inflicted on thieves, highwaymen, felons, and the like. It existed in anct. times in Greece and Rome, and was first employed in France in 1534. One mode was to stretch the criminal on a wheel with his hands and legs bent downwards along the spokes. The wheel was then turned so that the victim's limbs broke, while the bones of his body were broken with blows. At other times the corpse was exposed to public view on a wheel, the man having previously been beaten to death.

Wheel Animalcules, see ROTIFERA.

Wheeler, Joseph (1836-1906), an American soldier, b. in Augusta, Georgia. He entered the Confederate service in 1861, and took part in the

first campaigns in Kentucky and Tennessee. He distinguished himself in 1863 at Chattanooga Valley, and in 1865 as lieutenant-general commanded the cavalry in General Johnson's army until the end of the war. In 1898, having served as a Democrat in Congress (1881-89), he was appointed major-general of volunteers and placed in command of the cavalry division of the army of Santiago in the war with Spain, and from 1899-1900 commanded a brigade in the Philippines, becoming brigadier-general in 1900. He pub.: *History of Cuba, 1496 to 1899*; *Military History of Alabama*; *History of the Santiago Campaign*; *History of the Effect upon Civilisation of the Wars of the 19th Century*.

Wheeler, William Almon (1819-87), an American legislator, b. at Malone, New York. He was called to the Bar in 1845 and practised in Franklin County. He was a member of the New York Assembly (1858-59), acting as president *pro tempore*, and in 1860 was elected to Congress, being re-elected in 1869, when he served until 1877. He took a prominent part in the adjustment of Southern affairs under the Reconstruction Act, and settled the political difficulties in Louisiana by the well-known 'Wheeler Compromise.' He was vice-president of the U.S.A. under Hayes (1877-81).

Wheeling, a city and co. seat of Ohio co., Virginia, U.S.A., 46 m. by rail S.W. of Pittsburgh, on the Ohio R.; manufs. iron, steel, tobacco, foundry and machine-shop products, lumber, glass, and pottery. Pop. (1930) 61,659.

Wheel-lock, see FIREARMS.

Whelk, or Buckie (*Buccinum undatum*), a common mollusc off British coasts, much used as an article of food. The shell is grey or brownish white, spirally grooved and with numerous raised ridges. There are other species to which the name is also applied. The name dog whelk is commonly given to *Purpura lapillus*, and also to *Nassa reticulata*.

Whetstone, George (c. 1544-87), an Eng. poet and prose-writer, b. probably in London, dissipated his fortune at court and in reckless living, went to France, entered the Eng. army, then took up literature as a profession. He collected his verses into a volume called *Rocke of Regard*; wrote a play, *Promos and Cassandra*, and after an Italian visit a collection of prose romances.

Whewell, William (1794-1866), an Eng. philosopher, b. at Lancaster, became a fellow, later master, of Trinity College, Cambridge, and finally vice-chancellor of the uni-

versity. Among his works are: *Hist. of the Inductive Sciences*, *Philosophy of the Inductive Sciences*, *Elements of Morality, Plurality of Worlds*, etc., and translation of Goethe's *Hermann und Dorothea*. See Todd-hunter's *Whewell*, and *Life* by Mrs. Douglas.

Whickham, an urban dist., Durham, England, near the R. Derwent, has coal-mines, iron, steel, and chemical works. Pop. (1931) 20,800.

Whig, formerly the designation of one of the great political parties in England. The term is of Scottish origin, and was first used in Charles II.'s reign. According to some it was derived from *whiggamores* or horse drovers, and applied as a term of contempt (in allusion to the march of the people headed by the clergy to Edinburgh after the defeat of the Duke of Hamilton in 1648) to all who opposed the court. In England it was assumed as a party name by those politicians who took the lead in placing William III. on the throne. See POLITICAL PARTIES.

Whimbrel, see CURLEW.

Whin, see FURZE.

Whinberry, see BLAEBERRY.

Whinchat, or *Saxicola rubetra*, a pretty bird that visits Britain in summer, favouring heaths and open places, where it feeds principally on insects. It resembles the stonechat in plumage except in its white streaks on the head.

Whippet, a favourite dog, particularly in the N. of England, where it is much used for running races, being capable of tremendous speed; it is trained to make for the towel held at the end of the course by its owner. It is bred in various colours, including black, red, white, fawn, and brindle, and its appearance is that of a greyhound in miniature. Its head is long and lean, with small rose-shaped ears, long muscular neck, deep capacious chest, long back, arched over the loins; the fore legs are moderately long, and the hind-quarters strong and broad with muscular thighs; the tail is long and tapering.

Whipping, see under FLOGGING OR WHIPPING.

Whip-poor-will, or *Antrostomus vociferus*, a N. American goatsucker, so called from its cry during the nights of its breeding season. It is about 10 in. long, mottled tawny brown in colour, with a white collar on the throat, and has long stiff bristles at the base of the bill.

Whipsnade Park, the property of the Zoological Soc. of London, is designed for the breeding and exhibition of wild animals and as a sanctuary for native Eng. wild birds and plants. W. P. is on the edge of the

Dunstable Downs, and the main entrance is near the village of Whipsnade, $3\frac{1}{2}$ m. from Dunstable (34 m. from London). The park is 500 ac. in extent. Some animals and birds are without enclosures or kept in enclosures to which the public are admitted. The park was opened in May 1931 and up to that date £100,000 had been spent on the development of the estate. Admission is priced at one shilling, and the park is open from 10 a.m. to 'lighting up' time, daily, including Sundays.

See Sir Peter Chalmers Mitchell, *Guide to Whipsnade Zoological Park*, 1931.

Whip-snake, see DRYOPHIS.

Whirlpool, a vortex or eddy in water caused by the interaction of two or more currents of different strength, often by the re-uniting of a current divided by an obstacle. Dangerous Ws. may occur where tidal currents mingle on coasts; in myth and fiction the dangers are largely exaggerated, as in the case of Charybdis in the Straits of Messina and the Maelstrom of the Norwegian coast. Their danger lies in rendering steering difficult during rough weather, and increasing the chance of driving on to shore. In anct. times and the days of small sailing vessels they were distinctly to be avoided.

Whirlwinds are atmospheric vortices or eddies, the term being applied to those not so destructive as typhoons or tornadoes, but sufficiently marked to cause minor acts of damage. The essential feature of this type of disturbance is that the length of the horizontal diameter is exceeded by the height of the vertical axis. They are liable to spring up in deserts as dust-storms, or near the coast during anticyclonic weather. Some portion of the ground becomes more strongly heated than surrounding parts, the air in contact, being steady, rises in temperature, becomes less dense, and is driven upwards by incoming currents of cool air. The inequality in force of these gives rise to the swirling motions, which may be either clockwise or anti-clockwise. When of large size, a mile or so, and in humid weather, they may develop as small thunderstorms, or 'cloudbursts.' The lifting action is sometimes considerable, carts, trees, etc., being bodily transported. The W. in Kent, between Walmer and Deal, Oct. 24, 1878, destroyed everything along a track 450-700 ft. wide and more than a mile in length. Sometimes the vertical height of the disturbance is quite small. See Sir R. H. Scott, *Elementary Meteorology*, 1886.

Whisky, or **Whiskey**, a spirit obtained by distillation of the fermented ex-

tracts of cereals such as barley, maize, oats, etc. Potatoes, rice, sugar, molasses, and beet are also used. The substances are subjected to the processes of mashing, pitching, and fermenting and the resulting liquid called the 'wash' undergoes distillation (see BREWING). In Scotland and Ireland the distillation is carried out in pot-stills, which consist of large copper kettles or pots having a pear-shaped head and connected to a receiver by a copper worm which runs through a tub of cold water. The Scotch pot-still W. is almost entirely malt W. Irish pot-still W. is made from a mixed grist of barley, oats, maize, and malt, the last-named forming about one-third of the mixture. Potene or potheen is made in illicit stills from sugar and molasses. In England, W. is made in a patent still, whereby rapid distillation is ensured and a purer spirit is obtained, the percentage of fusel oil present in the 'silent spirit' produced being less than 0.05 per cent (see COFFEY'S STILL). W. is generally blended when in bond. In pot-still W., fusel oil, which contains the higher alcohols and pyro-compounds like furfural, is present to the extent of about 0.2 per cent. It was thought that during the maturing the fusel oil decomposed. This has since been found a mistaken idea and the cause of the increased flavour of the W. has been shown to be due to the interaction of the spirit with the substances absorbed by the casks from the wine which they previously contained. W. straight from the still is colourless, and the colouring of the various brands is carried out by storage wine casks or by the direct addition of caramel or maturing wine. Pot-still W. varies in strength from some 15° to 50° over-proof, while patent-still W. is generally 65° to 70° over-proof. Much of the latter quality spirit is used for making methylated spirit, gin, brandy, etc., and for manufacturing and scientific purposes. For use as a beverage the patent-still W. is matured in casks for several years or carefully blended with pot-still W. There are no recent statistics available on the consumption of W. in the United Kingdom; but it is officially declared by the Census of Production Authorities that consumption has declined in the United Kingdom but not in Ireland. See ALCOHOL, BREWING, COFFEY'S STILL, FERMENTATION, etc.

Whisky Insurrection, an uprising in Western Pennsylvania in 1794 against the imposition by the Federal Government of the excise law on domestic spirits. Washington sent a body of militia, who without bloodshed pacified the insurgents. This

was the first time Federal authority was used against a state, and is important in that respect.

Whispering Places, places like galleries or domes (*e.g.* that of St. Paul's Cathedral, London) of such a form that sounds produced in certain parts are concentrated by reflection from the interior walls to another distant part.

Whist, a card game for four players or in the case of a 'whist drive' for any number of sets of four players, the object of which is to score tricks. Every trick made in excess of six (thirteen being the highest possible) scores one point; in *short W.* five points make a game, and a score of two games out of three wins the 'rubber'; in *long W.* ten points make a game. In a *W.* drive the winners are those individual players who score the highest number of tricks or points, there being no question of a partnership as such taking a prize, because the individual players move from table to table according to the result of each hand. Partners holding all four honours (assuming the players elect to play for honours), *i.e.*, the ace, king, queen, and knave of trumps, score four points; three honours score two points. In *American W.* seven points make a game, and honours are not counted. The game of *W.* is a very old one, and derives its name apparently from the Cornish *huist* (silence), from the supposition that it requires concentration and silence on the part of the players to play the game.

Rules.—It is not proposed to do more here than notice those of the important rules which are less often observed. The deal commences with the player who cuts the lowest card in the draw, and then passes on to the player on his left, and so on. If, whilst dealing, a card be exposed by the dealer or his partner, the others can claim a new deal, provided they have not touched their cards; and a card exposed by either adversary gives that claim to the dealer, provided his partner has not touched a card. The trump suit is determined by turning up the last card dealt, which, of course, falls to the dealer. Any player may at any time inquire what the trump suit is. All exposed cards are liable to be called and must be left face upwards on the table. The following are exposed cards: (1) two or more played at once face upwards; (2) any card dropped face upwards in any way on or above the table, even though snatched up so quickly that no one can name it; (3) every card named by the player holding it. If any player lead out of turn, his adversaries may either call

the card erroneously led, or call a suit from him or his partner when it is next the turn of either of them to lead; but if, in spite of a lead out of turn, the other three players follow and complete the trick, the error cannot be rectified. In no case can a player be compelled to play a card which would oblige him to revoke, but the call may be repeated at every trick, until such card has been played. The penalty for a revoke is *either* a deduction of three *points* from the revoking player's score, or an addition of three *points* to the adversaries' score, or deduction of three *tricks* from the revoking player together with the addition thereof to the adversaries' tricks. A revoke cannot be claimed after the cards have been cut for the ensuing deal; but at the end of a hand, the claimants of a revoke may search all the tricks. If a player discover his error in time to save a revoke, the adversaries may call the card played in error whenever they think fit, or require the offender to play his highest or lowest card to that trick in which he has revoked; and any players who have played after him may withdraw their cards and substitute others. In whatever way the penalty be enforced, the revoker can under no circumstances win the game by the result of the hand during which he has revoked, nor can he score more than four. Dummy *W.* is played by three players. One hand called dummy's lies exposed. Dummy deals at the commencement of each game. He is not liable to penalties for revoke, as his adversaries see his cards. If he revokes and the error is not discovered until the trick is turned and quitted it stands good. If dummy's partner revokes, he is liable to the usual penalties. Dummy's partner may expose some or all of his cards, or declare that he has the game or trick without incurring any penalty; but if he lead from dummy's hand when he should lead from his own, or *vice versa*, a suit may be called from the hand which ought to have led. Double dummy is played by two players, each having a dummy or exposed hand for his partner.

Consult Cavendish in *Whist*; James Clay, *Treatise on Short Whist*; Major-General Drayson, *The Art of Practical Whist*; Dr. W. Pole, *Whist* (Club Series); and *The Philosophy of Whist*.

Progressive Whist and Gaming.—Progressive *W.* drives received a rude shock by the decision of the High Court in the case of *Morris v. Godfrey* (76 J.P. 297, 106 L. T. 890). Lord Alverstone's judgment emphasised the fact that the game was

played for money contributed by the players; and that *the necessarily indiscriminate manner in which partnerships were formed made the game practically one of chance*. He did not decide and did not intend to hold that W. became unlawful merely because it was played for money. The decision, it is conceived, is clearly bad if it goes the length of saying that *all W. drives are competitions in a game of chance*. The predominance of chance over skill must be proved in every individual case, and it would not be difficult in any given case to call an overwhelming number of the players to swear that they had had considerable experience in the game. In practice, club secretaries and others need have nothing to fear if, prior to the opening of the drive, they announce that the ticket money will go to defray all expenses, and that they do not guarantee to give any prizes. If prizes are subsequently given by outsiders, it is difficult to see how the above decision could affect those who organised the drive.

Whistler, James Abbot McNeill (1834-1903), a painter, lithographer, and etcher. He was b. at Lowell, Massachusetts, and in 1851 he became a cadet at the military college of West Point; but he soon decided to espouse art as a profession and accordingly, in 1856, he went to Paris and entered the studio of Gleyre, where Degas and Fantin-Latour were among his fellow-students. In 1859 he settled in London, but for a long time his work was little understood; and in 1877, when some of his nocturnes were shown at the Grosvenor Gallery, they were so fiercely assailed by Ruskin in *Fors Clavigera* that W. retaliated, suing his critic for libel, and at the same time claiming £1000. The case resulted in the plaintiff being granted only one farthing damages, but throughout the trial W. had shown himself a master of wit; and thenceforth till his death he was widely known in this relation, even by many people wholly unacquainted with his work as a painter. His etchings and paintings of the Thames are famous. He may be said to be the discoverer of the picture of London fog and Thames mist. One of his most celebrated paintings is that of his mother which was bought for the Luxembourg by the Fr. gov. His equally famous portrait of Thomas Carlyle and his 'Battersea Bridge' are in the Tate Gallery in London. Much has been written about him subsequently, notably a biography by E. and J. Pennell (London), 1909; but the best account of the Ruskin trial is contained in W.'s own book, *The Gentle Art of Making Enemies*

(London, 1890), which embodies also many excellent critical comments on art. See T. R. Way and G. R. Dennis, *The Art of Whistler*, 1903; J. Laver, *Life of Whistler*, 1930.

Whitaker, Joseph (1820-95), an Eng. publisher, b. in London; began business on his own account as a theological publisher in Pall Mall and later in the Strand. He pub., with Delph, *The Artist*, a fine-art review, edited the *Gentleman's Magazine*, and started the *Bookseller*, now the *Publisher and Bookseller*—the official journal of the British book trade. His name is familiar through *Whitaker's Almanack*, begun in 1868. He also produced *Reference Catalogue of Current Literature*, which is continued, and pub. a few devotional works.

Whitbread, Samuel (1758-1815), an Eng. politician, the son of a London brewer. Became a leading spirit in opposition to Pitt's gov. He disapproved of the Regency Bill in 1811, and having made the acquaintance of the Princess of Wales in 1812 constituted himself her champion in the House of Commons.

Whitburn: (1) A par. and vil., Durham, England, 3 m. N. of Sunderland; is a much frequented sea-bathing resort. Pop. 4400. (2) A par. and vil., Linlithgowshire, Scotland, 3½ m. S.W. of Bathgate; has coal and iron mines. Pop. (1931) burgh, 2440; civil par. including burgh, 12,619.

Whitby: (1) A seaport of the N. Riding of Yorkshire, England, at the Esk's mouth in the North Sea, 17 m. from Scarborough. A second lighthouse, 75 ft. in height, was added to the piers in 1931; the original lighthouse, which is 54 ft. high and was erected in 1855, still remains. The old and the new tn. (West Cliff) are connected by a swivel bridge. In its famous abbey, founded about A.D. 757 by St. Hilda, the poet Caedmon (d. c. 680) lived and the Council of W. was held. This building was destroyed by the Danes in the ninth century, and rebuilt in the eleventh. A Saxon cross was erected to Caedmon's memory (1898). W. is noted for its jet manuf., and its fisheries are important. Pop. (1931) 11,441. See *History of Whitby* by Charlton (1779), Young (1817); Atkinson, *Memorials of Old Whitby* (1894). (2) Port of entry of Ontario co., Ontario, Canada, on Lake Ontario. It has a good harbour. Saddlery and hardware are among the manufs. Pop. (1930) 2800.

Whitchurch: (1) An Eng. tn. in Hampshire, with agricultural interests. Shalloons and serges are manufactured. Pop. (1931) 6400. (2) An urban district, Shropshire, Eng. Pop. (1931) 6016.

White, Andrew Dickson (1832-1918), American diplomat and scholar, b. Nov. 7, at Homer, N.Y.; son of Horace W., a New Englander. Graduated, Yale, 1853. Studied in Paris. Attaché, St. Petersburg, 1854-55. Studied in Berlin. Professor of history and Eng. literature, University of Michigan, 1857-63. N.Y. State Senator, 1863-67. President, Cornell University, and professor of history there, 1867-85. Minister to: Germany, 1879-81; Russia, 1892-94. On Venezuela-Guiana Boundary Commission, 1896. Ambassador to Germany, 1897-1902. Chairman, American delegation, The Hague Conference, 1899. First president American Historical Association, 1884. Works include: *History of the Warfare of Science with Theology in Christendom*, 1896; *Autobiography*, 1905; *Seven Great Statesmen in the Warfare of Humanity with Unreason*, 1910. Died at Ithaca, N.Y., Nov. 4. See A. L. P. Dennis, *Adventures in American Diplomacy*, 1928.

White, Sir George Stewart (1835-1912), a British soldier, b. at Ballymena, co. Antrim. In 1853 he entered the Royal Inniskilling Fusiliers. Became captain (1863) and exchanged into the Gordon Highlanders, of which he later became colonel. Served with great ability in the Indian Mutiny and in the second Afghan War (1878-80), showing conspicuous bravery on several occasions. Accompanied Lord Roberts to Kandahar. Was awarded the V.C., made lieutenant-colonel and soon afterwards colonel. Fought in the Sudan War of 1884-85 and in the Burmese Campaign of 1885. For his services in these wars he was made K.C.B. and major-general. In 1893 he succeeded Lord Roberts as Indian commander-in-chief; in 1897, quartermaster-general of the forces. During the Boer War was unsuccessfully besieged in Ladysmith (1899-1900); was governor of Gibraltar (1900-04). See *Life* by Sir Mortimer Durand (1914).

White, Gilbert (1720-93), an Eng. clergyman and naturalist, b. in the village of Selborne in Hampshire, received his education at Basingstoke under Thomas Warton, and at Oriel College, Oxford. He became fellow of his college in 1744, and held curacies at Swarraton and Selborne. He accepted the living of Moreton Pinkney, a sinecure, in 1758, but lived near his native village of Selborne. Here his life became a round of tranquil observation of nature, and in 1789 he pub. *The Natural History and Antiquities of Selborne*, which had been in preparation since 1771. See R. Holt-White, *The Life and Letters of Gilbert White*,

1901; W. Johnson, *Gilbert White*, 1928.

White, Henry Kirke (1785-1806), an Eng. poet, b. at Nottingham. Some contributions to a newspaper introduced him to the notice of Capel Loft, by whose help he brought out a volume of poems, which gained him the friendship of Southey. Thereafter friends raised a fund to send him to Cambridge. Overwork, however, undermined his constitution and he died at twenty-one. Southey wrote a short memoir of him with some additional poems. See J. T. Godfrey and J. Ward, *The Home and Haunts of Henry Kirke White*, 1908.

White, Hugh Lawson (1773-1840), an American politician, b. in Iredell co., N. Carolina. He became dist. attorney at Knoxville (1807), judge of the Supreme Court (1809-15), and state senator (1807 and 1817). He was one of the commissioners to settle the Spanish Claims (1821-24), and was elected to the United States senate (1825-35, 1836-46). See *Memoir* by Nancy Scott (1856).

White, Richard Grant (1821-85), an American author, b. at New York. Intended for the church, he studied at New York, but turning to journalism, he contributed literary articles to the *Courier and Enquirer*. During the Civil War he wrote for the *London Spectator*, being of great service to the Federal cause. His great distinction is as a Shakespearean scholar. See his *Studies in Shakespeare*, 1885.

White, Stanford (1853-1906), American architect, b. New York City, Nov. 9, son of Richard Grant W. (q.v.). Designed New York University and Virginia University buildings; Washington Arch in Washington Square; and the Century Club building. Murdered by Harry Thaw in New York City, June 25.

White, Sir Thomas (1492-1567), founder of St. John's College, Oxford; and co-founder of Merchant Taylors' School; b. at Reading, son of a local tailor. Became a London merchant and, as Lord Mayor, defended the City against Sir Thomas Wyatt the Younger.

White, William Allen, American journalist; b. Feb. 10, 1868, at Emporia, Kan.; son of Dr. Allen W. Educated: Emporia College; University of Kansas. Entered journalism, 1890. From 1895, editor of *Emporia Gazette*, a remarkably good provincial paper. A famous editorial of his, against Populism, Aug. 1896, was 'What's the Matter with Kansas?' In France with American Red Cross, 1917. Delegate, Russian Conference, Prinkipo, 1919. Wrote a *Life* of Woodrow Wilson, 1924.

White, William Hale, better known

as Mark Rutherford (c. 1830-1913), an Eng. novelist, b. at Bedford. His theological views preventing him from joining the Congregational ministry, for which he was intended, he entered the Admiralty as a clerk, and rose to be assistant director of contracts. His works include: *The Autobiography of Mark Rutherford*, 1881; *Mark Rutherford's Deliverance*, 1885; and *The Revolution in Tanner's Lane*, 1887—a fine trilogy 'edited by Reuben Shapcott'; *Catherine Furze*, 1892, and *John Bunyan*, 1905. See his *Early Life and Autobiographical Notes*, pub. posthumously (1913).

White, Sir William Henry (1845-1913), Eng. naval architect; b. Feb. 2, in Devonport. Apprentice, Devonport Dockyard, at fourteen. Passed first into School of Naval Architecture, 1864. Professor of naval architecture there and at Royal Naval College, 1870-81. Chief Constructor, 1881. In charge of Sir Wm. Armstrong, Mitchell, and Co.'s yard, Elswick, 1883-85. Director of Naval Construction and Assistant-Controller of Royal Navy, 1885-1902. Died in Westminster, Feb. 27.

Whitebait, the fry of herrings and sprats. In the winter and spring young sprats form the great proportion of what is sold under the name, but in the summer, W. consists chiefly of young herrings.

Whiteboys, a secret Irish patriotic association, formed about 1820, and belonging to the group known as Ribbonism. It was condemned by the Catholic clergy, but only Catholics could belong, and they were all of the lowest classes. Their aims and methods were varied in different parts of the country, and the movement died down about 1855. The Westmeath Act (1871) declared Ribbonism illegal. See Sullivan, *New Ireland*.

Whitechapel, a parl. dist. in the E. of London, including the bor. of Stepney. The most notable buildings in it are the Tower and the London Hospital.

Whitefield, George (1714-70), the founder of the Calvinistic Methodists, b. at Gloucester, and educated at Oxford. W. was ordained deacon by Bishop Benson (1736). His preaching made an extraordinary impression. After a visit to Gloucester and Bristol, he set off to join the Wesleys in America (1737). W. remained in America till towards the close of the year. He then returned with the view of raising subscriptions for an orphan-house in Georgia. Now began that course of preaching in association with Wesley which established Methodism as a popular faith. W. set the example of open-air preaching (1739) near Bristol. He

repeatedly visited America, and traversed the whole extent of the British possessions. In 1748 he became known to Selina, Countess of Huntingdon, who made him one of her chaplains. W.'s printed works, besides an edition of Clarke's *Commentary on the Bible* (1759), consist principally of sermons and tracts, a journal of his life and labours, and three volumes of letters. A collection of his sermons, tracts, and letters, in 6 vols., 8vo, was pub. in London in 1771. See A. D. Belden, *Whitefield the Awakener*, 1930.

Whitehall, the main thoroughfare between Trafalgar Square and the Houses of Parliament in London, Eng. It passes through the main courtyard of the old Whitehall Palace (originally built by Hubert de Burgh in the reign of Henry III.), and is 150 ft. wide. Several public offices, including the Treasury, Horse Guards, Admiralty, and War Office, are at W.

History.—W. first became prominent after the Restoration of Charles II. In that period it was covered with a miscellaneous array of buildings, the Cockpit being the most prominent; the whole site was, in fact, known by this name. Plays were produced and there were, also, bowling alleys, cockpits, and pheasant courts. Later, in the same reign, it was occupied in part by gov. offices. The Cockpit was pulled down to make room for the Treasury which has been here ever since. By 1735 the older part of the present Treasury, designed by Kent, was completed and, as the century advanced, further encroachments were made on the old Cockpit site. For a time Soane's new building, with an imposing façade stretching from the corner of Downing St. to Dover House, satisfied those demands, but in 1845 it was displaced by Sir Charles Barry's dignified pile, which still dominates the western side of W. Dover House lies to the N. of Barry's Treasury. It was a former residence of George II.'s second son and of the second Lord Melbourne, but is now a gov. building. Its interior has not suffered much from official occupation. Consult *The Neighbourhood of Whitehall*, vol. ii., being vol. xiv. of the L.C.C. Survey of London, by Montague Cox and G. Topham Forrest, 1931.

Whitehall, a tn. of Washington co., New York, U.S.A., on Poughkeepsie R., and the Champlain Canal. It has railroad shops, silk yarn and grist mills, lumber mills and machine shops. The tn. also owns and operates the water-works. Pop. 5191.

Whitehaven, a mun. and parl. bor., seaport and market tn., Cum-

berland, England, 41 m. S.W. of Carlisle; has extensive docks, collieries, iron-mines, breweries, tanneries, and stone-quarries. Pop. (1931) 13,100.

Whitehead, Charles (1804-62), an Eng. poet and novelist, author of the reflective poem *The Solitary* (1831), and the humorous *Autobiography of Jack Ketch* (1834), which led indirectly to Dickens writing the *Pickwick Papers*. His novel *Richard Savage* (1842, new ed. 1896) was illustrated by Leech. See Bell, *A Forgotten Genius*, 1884.

Whitehead, William (1715-85), a poet laureate, wrote verses and plays. Two of his tragedies, *The Roman Father* and *Creusa*, were performed at Drury Lane in 1750 and 1754, respectively, and a comedy, *The School for Lovers*, in 1762. He was appointed poet laureate in 1757. His works were collected by William Mason (1788), who prefixed a Memoir of his friend to the edition.

White Horse, Vale of the, see **BERKSHIRE**.

White Lady, a legendary spectre of Teutonic tradition, said to appear in many of the Ger. castles and elsewhere, by night or day, usually to presage the death of some member of the family. She is supposed to be the ancestress of the race and sometimes watches over the children at night. There are countless popular legends about W. Ls., who often appear to peasants and shepherds; they comb their hair, spin, disclose treasures, and make gifts which turn into gold or silver. There is a W. L. in Scott's *Monastery*, and Scribe's *Dame Blanche* treats of the legend. The apparition is said to have appeared first in Bohemia in the fifteenth century as Dame Berchta, with whom other W. Ls. were identified.

White Lead, a basic carbonate of lead, having the formula 2PbCO_3 , Pb(OH)_2 . The compound is manufactured by several processes, the simplest of which consists in grinding litharge with water and sodium bi-carbonate. The Dutch process, by which the best quality W. L. is prepared, is carried out by placing spirals of sheet lead in pots at the bottom of which is vinegar, and covering with spent tan or dung for four or five weeks. The vinegar gradually evaporates through the heat generated by the tan and attacks the lead, forming a basic acetate. This is converted to W. L. by the action of the carbon dioxide evolved from the decaying tan. W. L. is a heavy amorphous powder, which is used as a pigment. Although very poisonous and liable to blacken in the presence of sulphuretted hydrogen, it is used very largely, as no substitute has been

found which possesses the same covering power or 'body.'

Whitelocke, Bulstrode (1605-75), an Eng. lawyer, called to the Bar in 1626. He sat for Stafford in parliament (1626) and for Great Marlow in the Long Parliament (1640). Siding with parliament on the outbreak of civil war, he became Commissioner of the Great Seal under Cromwell and his son. W. was sent to treat with Charles (1643-44) and on an embassy to Sweden (1653), negotiating the treaty of 1656. He opposed Cromwell's scheme for dissolving the Long Parliament (1653). On the Restoration W. was pardoned on payment of a fine. See his *Memorials*... (1682, 2nd ed., 1732); *Journal of the Swedish Embassy* (Reeve's ed., 1855). Consult R. H. Whitelocke, *Memoirs*, 1860; Foss, *Judges of England*, 1870; Campbell, *Lives of the Lord Chancellors*, 1708.

White Mountains, a range of mountains in New Hampshire (N.E.), U.S.A., especially the Presidential range in Coos co. (S.), forming a detached portion of the Appalachian system. A tableland, 10 to 15 m. broad, separates the two main groups, the East or White Mts. and the Franconia (with Lafayette Peak). Mt. Washington, the culminating peak, is over 6200 ft. high. There are fine waterfalls, and the wild scenery makes the dist. a favourite resort. See publications of the Appalachian Mountain Club.

White Pigments, see **PIGMENTS**.

White Plains, the co. seat of Westchester co., New York, U.S.A., 12 m. from New York City, on the Bronx R. There are numerous public institutions, and fine golf and country clubs. Pop. 35,830. See *Hist. of Westchester Co.*, by Scharf (1886), Shonnard and Spoonet (1900).

White River, a riv. of Arkansas and Missouri, U.S.A., rising in N.W. Arkansas, running N.E. into S. Missouri, where it drains part of the Ozark plateau, and returning to Arkansas flows S.E. and S. to join the Mississippi. Total length about 800 m., navigable for steamboats to Batesville.

White Russia, one of the constituent Socialist Soviet Republics of the Russian Union, was formed on Jan. 1, 1919, and finally established in Aug. 1920. It covered the provs. of Minsk, Vitepsk and Mogilov, and parts of Grodno and Gomel, being that part of the country inhabited mainly by White Russians, who form about 82 per cent. of the pop. (1926) of 4,983,884. The area is 48,751 sq. m. Poland and Latvia bound the republic on the W., and it adjoins Ukraine on the S., and the Western Area of the

Federal Republic on the N. and E. It is watered by the Dnieper and Pripiet in the centre and S., and by the Dvina in the N. Much of its area is covered with non-productive marsh and forest, but some cereals, flax and potatoes are grown and the timber industry is being developed. Horses, cattle, sheep and pigs are reared. The capital is Minsk; other large towns include Vitepsk, Gomel and Mogilev. There are over 5500 elementary and secondary schools in the republic, and three universities.

White Sea, a gulf of the Arctic Ocean, N. Russia. Its chief bays are Dvina (or Archangel) and Onega in the S., and Kandala in the N.W. Into it flow the rivs. Dvina, Onega, Vyg, and Mezen, and its chief port is Archangel. Herring, cod, and other fish are found in abundance. The sea is frozen over from Sept. to May.

White Slave Traffic, see PROSTITUTION; VIGILANCE SOCIETIES.

White Star Line, a line of steamships with a transatlantic passenger and cargo service from Liverpool and between the United Kingdom and Australia and New Zealand. The hull of the steamers is black with a buff line round it and white upperworks. The company was registered in 1927 to acquire from the International Mercantile Marine Company, through the Royal Mail Steam Packet Co., all the share capital of the Oceanic Steam Navigation Company. The authorised share capital of the W.S.L. is £11,000,000, the issued capital £9,000,000, and the paid-up capital £6,000,000. The Oceanic Steam Navigation Company was established in 1869 and was also known as the W.S.L. The first W.S.L. vessel was the old *Oceanic*, launched in 1870, but there is a new electric-driven vessel of the same name, launched in 1930, of 60,000 tons. Services with Australasia were established in 1883. The present company owns over a dozen vessels of more than 14,000 gross tonnage, besides many others. There are, besides the *Oceanic*, the *Majestic* 56,621 (1922), *Olympic* 46,439 (1911), *Homer* 34,351 (1922), *Britannic* 26,000 (1929), *Alberic* 18,940 (1927), *Laurentic* 18,724 (1927), *Ceramic* 18,495 (1913), *Arabic* 16,786 (1908), *Doric* 16,484 (1923), *Calgaric* 16,063 (1918), *Meganic* 14,878 (1900). Notable in the annals of the W.S.L. was the wreck of the *Titanic* on her maiden voyage in 1912. See TITANIC DISASTER.

White Vitriol, or Zinc Sulphate, $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, is a white crystalline solid made by dissolving zinc, zinc oxide, or zinc carbonate in dilute sulphuric acid, and evaporating the solution to crystallising-point. It is

very poisonous, and on heating splits up into water, zinc oxide, sulphur dioxide, and oxygen. It is used in the dye industry as a mordant, and also in the manuf. of varnishes.

Whitford, a par. and vil. of Flintshire, Wales, 3 m. N.W. of Holywell, has coal-mines, lead and zinc works, and limestone quarries. Pop. 3200.

Whitgift, John (c. 1530-1604), an Archbishop of Canterbury, b. at Grimsby. He was fellow of Peterhouse (1555), Lady Margaret professor of divinity, Cambridge (1563-67), master of Pembroke Hall and of Trinity College, Cambridge (1567-77), Dean of Lincoln (1571), Bishop of Worcester (1577), and Archbishop of Canterbury (1583-1604). He advocated the theories of Calvin, but supported Anglican ritual. He founded an almshouse and a fine grammar school at Croydon.

Whithorn (*Leukopibia* of Ptolemy), a royal bor. of Wigtownshire, Scotland, was the landing place of St. Ninian or Ringan, who built a church called 'Candida Casa' (397), in which he was buried (432), and which was long a place of pilgrimage. Pop. (1931), burgh, 951; civil par., incl. burgh, 1796.

Whiting (*Gadus merlangus*), one of the important European members of the genus to which the cod belongs. It is abundant in shallow water round the coasts of Britain and Ireland, and extends into the Mediterranean. It is slender in form and, like the much larger hake, differs from most of the other species of the genus in the absence of a barbel. It makes rapid growth, but rarely exceeds 20 in. in length, and is commonly taken much smaller.

Whiting, see CHALK.

Whitley, Rt. Hon. John Henry, ex-Speaker of the House of Commons; b. Feb. 8, 1866, at Halifax, Yorks; son of Nathan W. Educated: Clifton College; London University. M.P. (Liberal), Halifax, 1900-28. Junior Lord of the Treasury, 1907-10. Chairman of Ways and Means, 1911-21. P.C., 1911. In 1917, presided over committee that suggested joint industrial councils of employers and employed: 'Whitley Councils.' Speaker, 1921-28. Chairman, Royal Commission on Labour in India, 1929. Chairman, British Broadcasting Co., since 1930. See WHITLEYISM.

Whitley and Monksheaton, an urban dist. of Northumberland, England, is a seaside resort. Pop. (1931) 24,210.

Whitleyism or **Whitley Councils**, a device for securing improved relations between employers and employed. It had its origin during the Great War period, in 1916, when the gov. set up the Committee on Relations

between Employers and Employed, more widely known, from the name of its chairman, as the 'Whitley Committee.' In its first report the committee, recognising that the only basis for an improvement in relations was to be found in a fuller recognition of the claims of organised labour to a measure of 'control' in industry, expressed the view that a permanent improvement 'must be founded on something other than a cash basis.' There was already in existence in most organised trades elaborate machinery for negotiation and the settlement of disputes, and in one of its reports the 'Whitley Committee' made recommendations regarding conciliation and arbitration which were embodied in the Industrial Courts Act, 1919. Later the committee recommended the formation of joint industrial councils for the consideration of a variety of questions, including 'measures for securing to the workpeople a greater share in, and responsibility for, the determination and observance of the conditions under which their work is carried on,' 'technical education and training,' 'industrial research and the full utilisation of its results,' and 'improvements of processes, machinery, and organisation, and appropriate questions relating to management and the examination of industrial experiments.' Labour representatives, however, regarded these recommendations as a mere compromise because the functions of the joint councils were, in fact, to be more restricted than those exercised by many of the joint bodies set up by the gov. during the War. The result of several years' work of joint industrial councils shows that employers have been reluctant to relinquish to joint control any of the responsibilities to which they attach importance. But when the War Cabinet approved the first Report of the Whitley Committee, councils were brought into existence in many important industries and the principle was applied to the Civil Service and to local authorities, and during the early post-War period many of the bodies set up were concerned with vital problems of demobilisation and industrial organisation on a peace basis. More recently, however, the Whitley Councils have sunk into the background, and by 1923, of the seventy-three joint councils which had been set up, less than a score were functioning. There have, however, been some successful instances, notably in the flour-milling industry. See on this the *Manchester Guardian*, supplement on 'Industrial Relations,' Nov. 30, 1927.

Whitlock, Brand, American mun. reformer, diplomat, and novelist; b. March 4, 1869, at Urbana, Ohio; son of Rev. Dr. Elias D. Whitlock. Educated at home. Reporter on Toledo (O.) papers for three years. Served Illinois state, 1893-97; first as secretary to Governor Altgeld, then in Secretary of State's office. Admitted to Bar, 1894. Returned, 1897, to Toledo: its mayor, 1905-13; obtained new charter, providing for referendum and other modern improvements. Minister in Belgium, 1913-19: bearing great responsibility during Ger. occupation; made special efforts to save Edith Cavell. Ambassador to Belgium, 1919-22. Novels include: *The Thirteenth District*, 1902; *The Turn of the Balance*, 1907; *J. Hardin & Son*, 1923; *Uprooted*, 1927; *Big Matt*, 1928. Other books: *Abraham Lincoln*, 1908; *On the Enforcement of Law in Cities*, 1910; *Forty Years of It* (autobiography), 1914; *Belgium under the German Occupation*, 1918; *Lafayette*, 1929.

Whitman, a tn. of Plymouth co., Massachusetts, U.S.A., 21 m. from Boston. Manufs. include boots, shoes, leather-board, tacks, etc. Pop. (1930) 7638.

Whitman, Walt, originally Walter (1819-92), an American poet, perhaps the greatest literary genius the U.S.A. has produced, a native of Huntington, Long Is., was educated in the public schools of Brooklyn and New York. His early career was very varied, and he was apprenticed in turn to a doctor, lawyer, and printer. He then began teaching and contributing to the newspapers, was engaged as carpenter and builder, and spoke on political questions. In 1846 he became editor of the *Brooklyn Eagle* and in 1847-48 he made long walking tours up the W. rvs. into Canada. In this way he mingled with all sorts and conditions of men and came to know American democracy thoroughly. He found an outlet for expressing his democratic sentiments by writing verse, which he pub. in 1855 under the title of *Leaves of Grass*. The metre he employed was entirely original. He discarded the conventional laws of feet and rhyme, and wrote in musical rhythmic sentences of varied length. He was accused of indecency and immorality for his frankness in speaking of subjects usually tabooed, and the book was banned in Massachusetts in 1881, but was given the highest praise by Emerson and Thoreau. He was an ardent abolitionist and lost an editorial post because of this. From 1863 to 1873 he was in Washington, first as war correspondent and

later as a government clerk. He devoted all his spare time in visits to the hospitals where he acted as a volunteer nurse, helping the soldiers of the North and South alike, buying them little gifts out of his meagre resources. He also lost his position in the Department of the Interior because his chief objected to poems in *Leaves of Grass*, but obtained another in the office of the Attorney-General, which he held until he was partially paralysed in 1873. By that time, famous as the 'good grey poet,' he settled down in Camden, New Jersey, where he died. His *Leaves of Grass* is to-day an undisputed masterpiece, despite some poems that are rather dreary catalogues of names. The controversies it aroused at the time were largely due to his attitude on the physical side of life. As he defiantly put it, 'Of physiology from top to toe I sing.' But there was more than that in the book. There was his optimism, his faith in the future, his belief in democracy. There are no lovelier threnodies on death in any language and this is especially true of his celebrated poem on Lincoln, *When Lilacs Last in the Dooryard Bloomed*. He wrote of his experiences on the battlefield in *Drum Taps*, 1865, and *Memoranda during the War*, 1867. His other works include *Specimen Days and Collects*, a prose work, 1883; *Democratic Vistas*, 1870; and *November Boughs*, 1888. See his *Autobiography*, 1892; W. D. O'Connor, *The Good Gray Poet*, 1866; studies by Bucke, 1883; Binns, 1906; J. A. Symonds, 1906; Basil de Selincourt, 1913; E. L. Keller, 1921; Wells and Goldsmith, 1922; and John Bailey, 1926. See also *The Letters of Anne Gilchrist and Walt Whitman*, by T. B. Harned, 1918; and E. Holloway, *The Uncollected Poetry and Prose of Walt Whitman*, 1921.

Whitney, Eli (1765-1825), American inventor, b. Dec. 8, at Westborough, Mass. During the revolutionary war he was a nail-maker. He added to his income by teaching, and paid his way at Yale, where he graduated 1792. He went to Georgia to work as a tutor; but missed the situation and was befriended by the widow of General Nathaniel Greene of Mulberry Grove: in whose home W. devised his machine—the cotton gin. The neighbours stole it and forestalled his patent; so that when, with one Miller, he set up a manufactory in Connecticut in 1793, litigation consumed the proceeds. In 1798 he got a gov. contract for firearms, which was remunerative. Died at New Haven, Conn., Jan. 8.

Whitney, William Dwight (1827-

94), an American philologist, b. at Northampton; educated at Yale and Berlin. Studied Sanskrit, of which he became professor at Yale (1854). In 1870 professor of comparative philology at Yale. Edited many Sanskrit texts, and was recognised as one of the greatest Sanskrit scholars. Contributed to Böttlingk and Roth's *Sanskrit Dictionary*. Wrote also grammars of Ger., Eng., and Fr., and many works on comparative philology.

Whitney, Mount, a peak of the Sierra Nevada, S. California, named after J. D. Whitney, the famous geologist. It has an altitude of 14,099 ft. and is the highest peak in the U.S.A. proper.

Whitstable, a watering-place, Kent, England, at the mouth of the Swale, 6 m. N.W. of Canterbury, has famous oyster fisheries. Tankerton, a N.E. suburb, is a growing resort. Pop. (1931) 11,200.

Whitsunday, or Pentecost, a festival of the Christian Church celebrated on the seventh Sunday after Easter to commemorate the descent of the Holy Ghost on the Apostles at that time. Its name is probably an abbreviation of White Sunday, a name given to it on account of the white robes then worn by the newly baptised.

Whittier, John Greenleaf (1807-92), an American poet, was the son of a New England farmer. He was for a time a shoemaker, but afterwards took up journalism, and amongst other papers edited the *American Manufacturer*. In 1831 he produced his first volume of poems, *Legends of New England*, which secured his reputation as a poet, and also won popularity for its Abolition sentiment. Further works of his were: *Lays of my Home*, 1843; *Voices of Freedom*, 1846; *Songs of Labour*, 1850; and *National Lyrics*, 1865. This Quaker poet was in part inspired by Burns, and some of his best poems are pictures of rural scenes. His greatest poem is *Snowbound*, and equally famous in another kind is his searing poem *Ichabod!* devoted to Daniel Webster when the latter made a speech temporising with the Southern slave power. See *Lives* by Linton (1893) and Pickard (1895).

Whittington, Richard (d. 1423), Lord Mayor of London, the son of Sir William Whittington, was a London mercer, who held several municipal offices, and was thrice Lord Mayor of London (1397, 1406, and 1419). Around him has grown a legend, the original basis of which is lost.

Whittington and Newbold, or Newbold and Dunstan, an urban dist. of Derbyshire, England, 2 m. N. of Chesterfield, has collieries, iron-works

brick-works, and manufacturers of earthenware. Pop. 17,200.

Whittlesey, or Whittlesea, a market tn. of Cambridgeshire, on the Nen, near Wisbech. It has brick manufactures. Pop. 4200.

Whitworth, an urban dist., S.E. Lancashire, England; has coal mines, slate quarries, and cotton mills. Pop. (1931) 8400.

Whitworth, Sir Joseph (1803-87), a British engineer, b. at Stockport. After serving his apprenticeship as a mechanic, he set up in 1833 as a tool-maker in Manchester, and made experiments in rifles, cannons, etc. The Whitworth rifle was invented in 1857, and was adopted by the National Rifle Association in 1860 and by the War Office in 1869. He founded thirty scholarships in the Science and Art Department for the encouragement of engineering science. His business became a limited liability company in 1874, and amalgamated with the firm of Armstrong of Elswick in 1897.

Whooper, see SWAN.

Whooping-cough, an infectious disease of childhood characterised by spasms of coughing, consisting of a violent expiration followed by a strong inspiration causing the 'whoop.' There is, however, no doubt about its infective nature, and efforts should be made to disinfect all expectoration in order to prevent the spread of the disease. W. is most common among children under five years of age, and it is to be regarded as a particularly dangerous disease, not only on account of the high rate of mortality, but because it is apt to leave an enfeebled state of the system, especially of the respiratory organs. The disease is ushered in by catarrhal symptoms which are not to be distinguished from an ordinary cold. In from one to two weeks the paroxysmal cough stage is entered upon. Each paroxysm lasts rather less than a minute; the coughs succeed each other rapidly and alternate with whooping inspirations. The paroxysm often ends with vomiting, after which the child appears exhausted but free from pain. The paroxysmal stage may last from three to six weeks, after which there is a stage of decline. Possible complications are pneumonia, emphysema, hernia, cerebral hæmorrhage, etc. The treatment consists of careful attention to the general health. Atropine has been found useful in relieving the spasm, though it has no effect on the duration of the disease. In warm weather the child should be allowed to go out, and during convalescence open-air treatment in a mild climate is beneficial.

Whortleberry, or Huckleberry (*Vaccinium myrtillus*), see BILBERRY, BLAEBERRY, CRANBERRY.

Whymper, Edward (1840-1911), an Eng. artist, author, and mountaineer. He travelled among the Central and Western Alps (1860) to obtain sketches of Alpine scenery, and ascended Mont Pelvoux (1861). His ascent of the Pointe des Ecrins with a party (1864) was a remarkable mountaineering feat. W. also made the first ascent of the Aiguille Verte and in 1865 the famous first ascent of the Matterhorn (*q.v.*) by the N.E. ridge. W.'s successful ascent was his seventh attempt; during the descent four out of the party of seven were killed. He next visited Greenland (1867, 1872), Ecuador and the Andes (1879-80), and Canada (1901-05). Among his works are: *Scrambles among the Alps* (1871), *Travels amongst the Great Andes of the Equator, Supplementary Appendix . . .* and *How to Use the Aneroid Barometer* (1891-92); *Chamonix and Mont Blanc and The Valley of Zermatt and the Matterhorn* (new ed.), 1901. The British and South Kensington Museums contain specimens of his botanical collections from Greenland and S. America. See Heer in *Trans. of Roy. Soc.* (1869).

Whyte-Melville, George John (1821-78), an Eng. novelist and soldier, b. at St. Andrews and served in a Turkish cavalry regiment through the Crimean War. In 1850 he began writing sporting novels, chief of which are *Digby Grand*, 1853; *General Bounce*, 1855; *The Queen's Marys*, 1862; *Satanella*, 1873; and *Black but Comely*, 1879. He also wrote *The Gladiators*, *Songs and Verses*, and *The True Cross*. He d. from an accident in the hunting-field.

Wiborg, see VIBORG.

Wichita, the co. seat of Sedgwick co., Kansas, U.S.A., the second city in the state. It stands in the centre of a farming and agricultural dist., the chief product being wheat. Rich oil wells occur, and the city manufs. aeroplanes, brooms, lamps, flour, etc. Pop. 111,110.

Wichita Falls, a tn., Wichita co., Texas, U.S.A., on the Wichita R., 95 m. N.W. of Fort Worth; exports grain, and manufs. tanks, glass, mattresses, brooms, doors, etc. There are oil wells in the neighbourhood. Pop. (1930) 43,690.

Wick, a seaport and co. tn. of Caithness, in the extreme N. of Scotland, situated at the mouth of the little riv. of the same name. It has extensive herring fisheries and a good harbour. Pop. (1931) 7548.

Wickliffe, see WYCLIFFE.

Wicklow: (1) A maritime co., prov. Leinster, I.F.S.; bounded on the

N. by Dublin, S. by Wexford, E. by St. George's Channel, and W. by Carlow and Kildare. The county is famous for its beautiful scenery. Running through the centre from N. to S. are the Wicklow Mts., with the heights of Lugnaquilla (3039 ft.), Kippure (2473 ft.), and Duff Hill (2369 ft.), between which lie many fine gorges and valleys. The coast is a succession of steep cliffs and is dangerous for navigation; Wicklow Harbour is the only inlet of importance. The principal rivers are the Slaney and Avoca, the last named running through the Vale of Avoca and formed by the famous 'Meeting of the Waters' of the rivers Avonmore and Avonbeg; the Liffey and Vartry, the valley of the latter containing the reservoirs of the Dublin waterworks. The county is noted for its lovely glens, of which the best known are Glendalough, Dargle, Glenmalur, and the Devil's Glen. Granite is quarried in the W., and gold, copper, and lead are found. Sheep and cattle are reared in increasing numbers, and pasturage occupies the greater part of the cultivated land. Oats and potatoes form the main crops. The chief tns. are Wicklow (the county tn.), Bray (7700), and Arklow (5000). The county comprises 8 baronies and returns 3 members to Dail Eireann. In the Vale of Glendalough are the ruins of the 'seven churches,' and there are other monastic remains, besides several castles. The area is 500,216 acs. Pop. 57,000. (2) A seaport, market tn., and co. tn. of co. Wicklow, Ireland, 31 m. S.E. of Dublin. Its chief importance is due to the harbour, built to accommodate large vessels, with two fine piers. Trade is carried on in coal, timber, iron, and slate, which form the chief imports, while grain is the principal export. There are large chemical works. There are ruins of a thirteenth-century monastery and part of the parish church dates from the Norman period. Pop. 3000.

Widgeon, *Wigeon*, or *Mareca penelope*, a duck which visits Britain in winter, usually breeding farther N. It is about 18 in. long. The plumage is grey and brown pencilled with black, the head and neck reddish-chestnut, the underparts white. Its flesh is valued for the table. The American W. (*M. Americana*) is a larger bird and has occasionally reached Britain.

Widmann, **Josef Viktor** (1842-1911), Moravian-Swiss poet; b. Feb. 20, at Nennowitz, Moravia. Studied theology: Heidelberg; Jena. Organist at Liestal, 1866. Assistant-pastor, Thurgau, 1867. Director

of a girls' boarding-school, Bern, Switzerland, 1868-80. Thenceforth literary editor of *Berner Bund*. Wrote librettos for Hermann Götz, Brüll, and others. Works include: *Arnold von Brescia* (tragedy), 1867; *Buddha* (epic poem), 1869; *Der Wunderbrunnen von Is* (epic poem), 1871; *Mose und Zipora* (idyll of heaven and earth), 1871; *Onone* (tragedy), 1880; *Die Patrizierin* (novel), 1888; *Maikäferkomödie* (allegorical play), 1897; *Die Heilige und die Tiere* (dramatic poem), 1905. Died at Bern, Nov. 6.

Widnes, a tn. and municipal bor. of Lancashire on the Mersey, with manufactures of chemicals, soap, and iron. Pop. (1931) 40,600.

Widow. *Legal Rights*.—On the death of her husband, intestate, the W. is entitled to the whole of his property (real and personal) unless there be surviving also a child or grandchild, when she takes one-half for life (the other half going to children equally or grandchildren *per stirpes*). She also takes absolutely (a) all the 'personal chattels,' i.e. articles of household use or ornament, etc. (not used for business purposes), and (b) £1000 free of death duties and expenses. She is also entitled to the grant of letters of administration of his whole estate, though the court may in its discretion make the grant to the next-of-kin instead or to both the W. and the next-of-kin jointly. W.-bench by a Sussex custom meant the share a W. was entitled to of her husband's estate, over and above her jointure. The term *widow's chamber* denoted the apparel and furniture of the bed-chamber of the W. of a freeman of London, to which she was once entitled. The rights of 'dower' or the 'W.'s third' in her husband's real estate has also been abolished. See also *TERCE*, *JUS RELICTÆ*, and *SATI*.

Wied, **William Frederick Henry**, see **WILLIAM OF WIED**.

Wieland, **Christoph Martin** (1733-1813), a Ger. author, the friend of Goethe, Schiller, and Herder, was b. near Biberach in Württemberg, the son of a Swabian pastor. While still at the University of Tübingen, he published a didactic poem *Die Natur der Dinge* (1751), which was followed by works of like seriousness, such as *Der gepriefte Abraham* (1753) and *Sympathien* (1755), written under the influence of Bodmer. In 1760, he was appointed director of the Chancery of Biberach. He then published a translation of Shakespeare, the first issued in Ger. (1762-66), and wrote some delightful prose romances: *Araspe und Panthea* (1761), *Don Sylvis von Rosalva* (1764),

and *Agathon* (1766). His most important contributions to Ger. poetry are *Musaria* (1768), *Iäris* (1768), *Der Neue Amadis* (1771), and *Oberon* (1780). He was appointed professor of philosophy and literature at Erfurt (1769-72) and then became tutor to Prince Charles Augustus at Weimar. His famous prose romance, *Der Goldene Spiegel*, appeared in 1772, and its sequel, *Der Danismend*, in 1775. Complete editions of his works appeared in 1818-28 and in 1900. See *Lives* by Gruber (1818), Döring (1846), and Seuffert (1900).

Wieliczka, a tn. of Polish Galicia, in the circle of Bochnia. It is remarkable for its celebrated salt-mine, which extends under the whole tn. and to a considerable distance beyond it on each side. Pop. 6100.

Wien, Wilhelm (1864-1928), a Ger. physicist, professor of physics at Giessen, Würzburg, and Munich successively; he was awarded the Nobel prize in 1911. His chief work was in connection with radiation, in which branch of physics he discovered important relations between energy-density, wave-length, and absolute temperature; and he also made fundamental discoveries concerning positive rays. See his *Neuere Probleme der theoretischen Physik*, and the *Annalen der Physik*, passim.

Wiener-Neustadt, a tn., Lower Austria, has manufs. of ammunition, engines, textiles, pottery, and leather. The old castle (twelfth century) was converted into a military college (1752). Pop. 40,700.

Wiesbaden, the cap. of the duchy of Hesse-Nassau on the N. slopes of the Taunus range, has sulphurous springs which have made it a world-famous watering-place. Occupied by the British Army of the Rhine for some years after the evacuation of Cologne (q.v.). Pop. 152,000.

Wife, see HUSBAND AND WIFE; MARRIAGE AND MARRIAGE LAW.

Wig, the use of Ws. is very old, and nothing is known of their date of origin, though it may be otherwise with regard to particular styles of Ws. The Emperor Otho is said to have worn a W. which was so well made that it could not be distinguished from natural hair, and there is evidence in Ovid that the Rom. ladies wore blond wigs to enhance their charms. In France they appear to have been worn even before the Middle Ages, though according to Mézeray they were not introduced until the reign of Louis XIII. They were probably not common in England before the Tudor period, but thereafter became the height of fashion. It was only during the lat-

ter half of the eighteenth century that Ws. passed out of general use except in the professional classes. Physicians, says Lecky, discarded their great Ws. and assumed what Boswell called the 'levity of bag wigs.' The same historian tells us that in 1765 the perruque makers had become so depressed in their calling that they presented a petition to the king 'complain[ing] bitterly of the growing custom of gentlemen wearing their own hair, employ[ing] foreigners to dress it,' and begged the king to discountenance such usages by his example. Some notable types of Ws. were the *Blenheim*, so named after the battle; the *cauliflower*, a powdered curled wig much in vogue in the time of Beau Nash; the *full-bottomed W.*, worn by judges on ceremonial occasions.

Wigan, a market tn., parl., and municipal bor. of Lancashire, England, on the R. Douglas. It is an anct. place, divided by the river into two parts. Its chief industry is the manufacture of cotton, but it also makes chemicals, soap, iron and brass goods. It is the centre of a coal dist. Pop. (1931) 85,400.

Wiggin, Kate Douglas (Mrs. Riggs) (1859-1923), American author; b. Sept. 28, in Philadelphia; daughter of Robert Noah Smith, lawyer. In infancy removed to Hollis, Me. Went to Los Angeles, California, 1876; opened first free kindergarten on Pacific coast, San Francisco. Married, 1880, Samuel Bradley Wiggin, lawyer, who d. 1889. In 1895, married George Christopher Riggs. Works, which deal with rural New England, include: the 'Penelope' series, 1893-1915; *Rebecca of Sunnybrook Farm*, 1903; and *Mother Carey's Chickens*, 1911. Died at Sudbury Hill, England, Aug. 24.

Wight, Isle of, an island off the coast of Hampshire, in which county it is included, in the Eng. Channel, separated from the mainland by the Solent and Spithead. It forms, however, a separate administrative county. Area 147 sq. m.; greatest length 23½ m.; greatest breadth 13 m. It has chalk cliffs and downs, the highest elevation being St. Boniface Down (787 ft.). Off the W. coast are the rocks known as the 'Needles.' The scenery of the I. of W. is picturesque, with its ravines or 'chines.' The climate is pleasant and healthy, and the sea-bathing excellent, so that the Isle is a favourite with holiday-makers. Important tns. are Newport (the cap.), Ryde, Shanklin, Ventnor, Cowes, and Sandown. Pop. (1931) 88,500. See G. E. Mitton's *The Isle of Wight*, 1911.

Wigtown, a peninsular co. in the S.W. corner of Scotland, is divided

into three dists.—the Machars, or low country, lying between Wigtown and Luce Bay; the Rhynns, which comprehends the portion to the W. of a line drawn between Luce Bay and Loch Ryan; and the Moors, which includes the remainder. The climate is salubrious, although the rainfall is considerable. Nowhere does the land rise to a great elevation and there are no considerable rivers. The Cree and the Bladenoch are both navigable for a certain distance. The principal tns. are Stranraer, Wigtown, and Newton. The principal occupation is agriculture. Area 311,609 acs. Pop. (1931) 29,300.

Wigtown, a market tn., royal and parl. bor. of Scotland, cap. of Wigtownshire. The inhabitants are mainly engaged in fishing. Pop. (1931) 1261.

Wigwam, the hut or cabin of N. American Indians, which consists of a rough conical framework of poles stuck into the ground below and converging above, covered with bark, matting, or tanned hides, with an aperture at the top for the exit of smoke. W. is the Eng. corruption of *wekow-on-ut*, 'in his house.'

Wilamowitz-Möllendorf, Ulrich von (1848-1931), Ger. classical scholar; b. Dec. 22, at Markowitz, Posen; brother of Hugo, Baron W.-M. Educated: Bonn; Berlin. Privat-docent, Berlin, 1874; professor of classical philology: Greifswald, 1876; Göttingen, 1883; Berlin, 1897. Works include: *Analecta Euripidea*, 1875; trans. of Æschylus' *Agamemnon*, 1885; Euripides' *Herakles*, with introduction on Attic tragedy, 1889; trans. of Euripides' *Hippolytos*, 1891; *Aristoteles und Athen*, 1893; *Reden aus der Kriegszeit*, 1915; *Die Ilias und Homer*, 1916; *Platon*, 1919; *Hellenistische Dichtung*, 1924; *Pindaros*, 1922; *Die Heimkehr des Odysseus*, 1927; *Erinnerungen*, 1928. Died in Berlin, Sept. 25.

Wilberforce, Samuel (1805-73), bishop of Winchester, b. in London, the third son of William W. (q.v.). He upheld the traditions of the Anglican orthodoxy during the days of the Tractarian movement and the secession to Rome of men like Newman and Manning. He published *Eucharistica*, 1839; *Agathos*, 1840; and *The History of the Protestant Episcopal Church in America*, 1844.

Wilberforce, William (1759-1833), a philanthropist, entered parliament when he attained his majority, and soon became on intimate terms with the leading statesmen of the day, with most of whom he corresponded. He was to the fore in many philanthropic movements, but the great work of his life was in connection with the

abolition of slavery, of which cause he assumed the leadership in 1787. It was not until twenty years later that his dream was realised, and a Bill received the royal assent. He was associated with societies for the suppression of vice, the Bible Society, and many missions. There is a Biography by his sons, Robert and Samuel (1838), who also ed. *Correspondence* (1840). See also R. Coupland, *Wilberforce*, 1923.

Wilbur, Ray Lyman, b. Boonesborough, Iowa, U.S.A., April 13, 1875, educated at Stanford University. After various college posts became professor of medicine at his alma mater 1909-16 and president of the university 1916-29. Like Hoover, a native of Iowa and graduate of Stanford, he became associated with the latter in the Food Administration during the Great War. When Hoover became President, he named his old friend to the Cabinet post of Secretary of the Interior in 1929.

Wilcox, Ella Wheeler (1855-1919), was an American writer of verses, mainly noticeable for their platitudes, which were once accepted by a huge public in the U.S.A. and Great Britain as genuine poetry of a high order. Her output was considerable, and many of her volumes ran into numerous editions. She may be said to have been for the world of real poetry what the late Marie Corelli was for the world of real fiction. Her *Collected Poems* were pub. 1921.

Wild, Jonathan (c. 1682-1725), a notorious Eng. thief, b. at Wolverhampton, who organised a band of thieves and opened offices in London for the restoration of the property which his own employees had stolen. He was arrested and hanged at Tyburn. His fame lives in Fielding's novel, *The Late Mr. Jonathan Wild the Great*, 1743.

Wildbad, a watering-place, Württemberg, Germany, in the Enz ravine of the Black Forest, 14 m. E. of Baden-Baden; has thermal alkaline springs and baths. Pop. 5300.

Wild Birds Protection Acts, see CLOSE TIMES.

Wild Boar, see BOAR, WILD.

Wilde, Oscar O'Flahertie Wills (1856-1900), an Irish dramatist and essayist, was the younger son of Sir William W., the Dublin surgeon, by his wife, née Jane Francisca Elgee, who was known in literary and political circles for her writings over the signature 'Speranza.' Educated at Magdalen College, Oxford, W., a disciple of Pater, there founded an æsthetic cult, for advocating which he was ridiculed. Gilbert parodied him as Archibald Grosvenor in *Patience*. In 1882 W. went to

America and lectured on æsthetic philosophy. He had already, in 1881, pub. a volume of poems, which, in spite of affectations, attracted attention by their finish and the music of the verse. It was seven years later when he issued *The Happy Prince and Other Tales*, the fairy story that gave its name to the volume being exquisite. *Lord Arthur Savile's Crime, and other Stories*, and his only novel, *The Picture of Dorian Gray*, both appeared in 1891. It is probably as a dramatist that W. will ultimately be remembered, and, with the exception of *Salome* (1893), his successes were made in the realm of light comedy, where he could give full play to his fantastic wit. *Lady Windermere's Fan* (1892), *A Woman of no Importance* (1893), and *The Ideal Husband* (1895) were each and all successful, but his masterpiece was that 'moral comedy for serious people,' *The Importance of being Earnest* (1895), which places him in the same rank with Goldsmith and Sheridan. In 1895, following a libel action which W. brought against the Marquis of Queensberry, he was convicted of immoral conduct and sentenced to two years' imprisonment under the Criminal Law Amendment Act. From 1897 until his death in 1900 W. lived on the Continent, mainly in Paris. His last works were *The Ballad of Reading Gaol*, 1898, and *De Profundis* (posthumous, 1905). See Life by Sherrard; also F. Harris, *Oscar Wilde; his Life and Confessions*, pub. New York, 1913; A. H. Cooper-Prichard, *Conversations with Oscar Wilde*, 1931.

Wildebeest, see GNU.

Wilderness, a desolate region S. of the Rapidan R., in Virginia, U.S.A., 15 m. W. of Fredericksburg, where a battle of the Civil War was fought under the command of the rival generals, Grant and Lee.

Wiley, Harvey Washington (1844-1930), American chemist; b. Oct. 18, at Kent, Ind. Graduated, Hanover College, 1867; M.D., Indiana Medical College, 1867; B.S., Harvard, 1873. After teaching classics and science in various institutions, he became professor of chemistry: Butler University, 1874; Purdue University, 1874-83. During latter period, he was also State Chemist. Chief chemist, U.S. Department of Agriculture, 1883-1912—aroused malignity by zeal on behalf of purity in food and drugs. President: American Chemical Society, 1893-94; American Therapeutic Society, 1911. Wrote technical books—also: *Songs of Agricultural Chemists*, 1892; *Autobiography*, 1930. Died at Washington, June 30.

Wilfrid, St. (634-709), a bishop of York, was a Northumbrian by birth, and was educated in the monastery at Lindisfarne. W. supported the Rom. party in the Synod of Whitby in 664 and was consecrated bishop in the same year. He appealed to Rome against Ægfrid of Northumbria, and on his return to England (681) was shipwrecked off Frisia, where he made many converts.

Wilhelmshaven, a former military port and seaside-resort of Hanover prov., Prussia, on the N.W. shore of the Jade Busen, 18 m. from Bremerhaven. It was the station for the Ger. North Sea fleet and has a fine harbour for war-vessels and slips for trading vessels. The territory was acquired from Oldenburg (1853). There are docks, moles, foundries, and workshops, boiler-works, a signalling-station, and a meteorological observatory. Pop. about 26,010. See von Krohn, *Vierzig Jahre in einem Deutschen Kriegshafen*, 1905; Eberhard, *Führer durch Wilhelmshaven*, 1906.

Wilhelmshöhe, see KASSEL.

Wilkau, a vil. of Saxony, Prussia, S.E. of Zwickau, has iron-foundries. Pop. 8300.

Wilkes, Charles (1801-77), a naval officer, b. in New York. Entered the navy 1816, appointed to the Depot of Charts and Instruments, Washington, 1830. Commanded an exploring expedition from 1838-42; surveyed the Samoan group, discovered many islands, and the Arctic continent. In 1861 he commanded the steamer *San Jacinto*, and forcibly removed from the British mail-steamer *Trent* Messrs. Mason and Slidell, commissioners of the Confederate states to England and France. He commanded a squadron in W. Indies, and was made rear-admiral, 1866. He wrote *Narrative of U.S. Exploring Expedition; Western America; Theory of the Winds*, etc.

Wilkes, John (1727-97), a politician, was in early life a dissolute man, and was one of the fraternity of Medmenham monks. He entered parliament in 1757, and was later active in opposition to the Tory minister, Bute. He founded, in 1762, *The North Briton*, to which Charles Churchill was a valuable contributor, and in the following year was arrested for a libel uttered in the famous No. 45. He was found guilty but pleaded privilege as a member of parliament. He was expelled from Westminster in 1764, and went abroad for four years. After his return he was elected member for Middlesex by a large majority, but was expelled in 1769 for another libel. He was thrice returned for Middlesex on the strength of his enormous popu-

larity, but was not allowed to take his seat until 1790. In 1774 he was elected Lord Mayor of London, and from 1779 until his death was city chamberlain. W. supported the American colonials in their war with England, and at home stood for reform of parliament and the freedom of the Press. His correspondence was pub. by John Almon in 1805. There are biographies by Fraser Rae and Percy Fitzgerald.

Wilkesbarre, a co. seat of Luzerne co., Pennsylvania, on the Susquehanna R., in an anthracite coal-mining dist. It has iron and steel industries, cigar factories, silk and other textile mills, and railroad shops. Pop. (1930) 86,626.

Wilkie, Sir David (1785-1841), a Scottish painter, b. at Cults, in Fife. He studied art in Edinburgh and then went to London. In 1811 he was made R.A., and in 1825 he travelled in Spain, while shortly after his return to England he was appointed painter to the crown, and in 1836 he was knighted. Four years later he visited Turkey and Palestine, and, dying on board ship while on his way home, he was buried at sea near Gibraltar.

Wilkins, Sir George Hubert, Australian explorer, naturalist, and aeronautical photographer; b. Oct 31, 1888, at Mt. Bryan E., S. Australia; son of H. Wilkins of Netfield. Educated: State School; Adelaide School of Mines. Second in command, Stefansson's Party, Canadian Arctic Expedition, 1913-17. Joined Australian Flying Corps, 1917: became captain; official photographer, military history department, 1917-18. Navigated Blackburn Kangaroo aeroplane, England-Australia flight, 1919. Second in command, British Imperial Antarctic Expedition, 1920-21. Naturalist with Shackleton's last Antarctic expedition, 1921-22. Led British Museum's Australia and Islands' Expedition, 1923-25. Commanded two Arctic expeditions, 1926-27 and 1928; flew from Point Barrow, Alaska, to Spitzbergen. Knighted, 1928. Led Antarctic expedition, 1928-29: flew from Deception Island across Graham Land, 600 m.; and, from a new base to S. of Adelaide Island, explored a fresh 300 m. of the Antarctic continent's coast-line. In 1931 he planned reaching the North Pole in the submarine *Nautilus*, and some successful preliminary voyages under the ice were made from Bergen. Works: *Flying in the Arctic*, 1928; *Undiscovered Australia*, 1928; *Under the North Pole*, 1931. See also ANTARCTIC OCEAN AND EXPLORATION and ARCTIC EXPLORATION.

Wilkinsburg, a bor., Allegheny co., Pennsylvania, U.S.A.; is practically an eastern suburb of Pittsburgh. Pop. (1930) 29,539.

Wilkinson, James (1757-1825), an American soldier, b. in Benedict, Maryland. He entered the American service in 1775, fought outside Boston, serving in turn under Arnold and Gates, and was clothier-general of the continental army (1779-81). While under the influence of liquor, W., who was on the staff of General Gates, disclosed the Conway Cabal and supplanted George Washington by Gates as commander-in-chief of the American army. In later years he had some part in the Burr conspiracy. His service in the war of 1812 was unsatisfactory and W. was finally relieved of all command.

Wilkinson, John (1728-1808), Eng. iron-master, b. in Cumberland, son of a furnace hand. He began the manufacture of wrought iron at Broseley, being the first to use coal for smelting, and also to use Watt's steam engine for blowing the bellows. Later, with the aid of steam cylinders, his blast furnaces were capable of producing anything from cannon to iron bridges. He was without a rival as an iron-master in his day, securing contracts not only from the British gov. but from foreign govts.

Will, in psychology, 'covers all active neutral operations, all our doings, such as walking, speaking, attending to things, together with efforts to do things, active impulses and resolutions.' Thus W. forms one of the three sides of Mind—Feeling, Knowing, and Willing, and for their connection and opposition the reader is referred to EMOTIONS. By simply noting that the first actions are bodily, simple, and external, and are merely responses to sense-impressions, while the later ones are complex, internal, and representative, e.g. choosing, it can be seen that the laws governing the growth of will are the same as those which govern intellectual development, and are outlined in EMOTIONS (q.v.), these being exercise, retentiveness, and association. W. is usually divided into *external* and *internal*, the former including muscular action and the latter mental action and voluntary attention or concentration. Yet although these are separate branches, they are interdependent, for attention involves muscular activity and voluntary movement attention; while in complex processes, e.g. choosing, attention plays a great part. Early movements may be divided into *random movements*, which result from the excitation of motor centres, and are not preceded by any conscious

element, and *reflex movements*, which result from sensory stimulation. Examples of the first class are the movements of the legs and arms of babies; of the second, the closing of the fingers of an infant on an object placed in its hand. Neither of these have any psychical accompaniments, but *instinctive movements*, e.g. the sucking of an infant, while closely analogous to reflex movements, seem to possess some element of desire or striving to an end. Bain has shown that *random movements* are the commencement of the development of voluntary movement, while Spencer and others take *reflex movements* as the initial stage. The individual differences of W. depend chiefly upon keenness of desire, and beyond this upon the power of the disposition to act. Self-control implies W., and by many this is considered to be different from the earliest forms, for it involves a force which can overcome desire and aversion. This immediately leads to the question of the nature of free-will, or deliberative choice. This function is evidently the highest form of the activity of the W. Particularly free-W. means a W. 'unfettered by imposed restraint or compulsion in any form.' Philosophy has built upon this the idea that in choice-accompanied action the result may be undetermined, and not always determined by desire or aversion. That is, the W. is self-determining, and may lead action away from the strongest desire. This may be said to be a metaphysical doctrine, since it implies a theory respecting the nature of the mind and the ego in itself as an active principle, so leading to questions concerning power and causality (q.v.). See DETERMINISM, PSYCHOLOGY. INSTINCT, KANT, LOTZE, HERBERT, DESCARTES, SCHOPENHAUER, SIDGWICK, CALVIN, HUME, HOBBES, and BAIN. Read Sully, *Handbook of Psychology*; *The Human Mind* (2 vols.).

Will and Testament, see WILLS.

Willard, Frances Elizabeth (1839-98), an American writer and educationist, was b. at Churchville, New York, and educated at the North-Western Women's College at Evanston, where she became professor and finally dean. She was also president of the Woman's Christian Temperance Union (1879), and wrote: *Women in the Pulpit*, 1888; *My Happy Half-Century*, 1894, etc. See Ray Strachey, *Frances Willard, her Life and Work*, 1912.

Willcocks, Sir William, British engineer; b. 1852; son of Captain W. Willcocks. Educated: Roorkee College, India. Attached to: Indian Public Works, 1872-83; Egyptian

Public Works, 1883-97—projected and designed the Assuan Dam, 1898. K.C.M.G., 1902. In 1911, engaged upon irrigation in Mesopotamia. His books include: *Egyptian Irrigation*, 1889; *Irrigation of Mesopotamia*, 1905; *The Nile Projects*, 1919. Writes also on biblical subjects.

Willems, Florent (1823-1905), a Belgian artist, b. at Liège. He studied at the Mechlin Academy and in 1844 settled in Paris. He was inspired by the work of old Dutch masters, and drew his subjects chiefly from indoor domestic life.

Willesden, an urban dist. of Harrow div., Middlesex, England, 7 m. from St. Paul's, London, 1 m. from W. Junction. W. Green, Cricklewood, and Neasden (N.) are adjoining dists. Kilburn and Brondesbury lie to the E., and Harlesden to the S. St. Mary's Church has Norman remains. Pop. (1931) 184,400.

Willett, William (1856-1915), originator of 'daylight saving' (q.v.); son of a builder and himself a builder, b. at Farnham, Surrey, Eng., Aug. 10, and educated at Marylebone Grammar School. Notable for the type of house built on hygienic lines with ample window light and various other advantages founded on garden-city principles. He is said to have first hit upon the idea of daylight saving in the summer of 1907, when his attention was attracted to the large number of drawn blinds at a comparatively early hour in the evening. He immediately began to urge reform and wrote a pamphlet, *The Waste of Daylight*, which ran into numerous editions. A bill, which was introduced into the House of Commons by Robert Pearce in 1908, failed and was re-introduced in 1909 and 1911, but was only passed in 1916 and then only as a war-time measure. It was, however, continued till 1925 when it was replaced by the present Summer Time Act. Thus W., who died at Chislehurst in 1915, never lived to see the fruition of his work.

William, Ex-Crown Prince of Germany (b. 1882), eldest child of ex-Emperor William II. (q.v.), b. at Potsdam, May 6. Married in June 1905, Duchess Cecilie Augustine Maud, younger sister of the Grand Duke Frederick Francis IV. of Mecklenburg-Schwerin. Served in the First Foot Guards. Toured the Far East, 1910-11; represented the Kaiser at the Coronation of King George V., 1911. In the early months of the Great War he commanded the 5th Army, and, later, was in command of an Army Group and in titular command of the great operations at Verdun. Won no distinction as a commander and in the Meux-

Argonne operations, Sept. 1918, was decisively defeated by the Fr. and American armies. After the war he fled to Holland and settled at Wieringen, renouncing his rights of succession in 1918. Returned to his Silesian estate in 1923 and has since tried, with less success than embarrassment to the Ger. gov., to intervene in politics, and, in 1932, he publicly stated that he would vote for Adolf Hitler, thus deserting his old generalissimo, Hindenburg. Published his reminiscences under the title of *Ich suche die Wahrheit*, 1922.¹

William I., surnamed **The Conqueror** (1027-87), King of England, was a natural son of Robert II., Duke of Normandy, but, in spite of the bar sinister, succeeded to his father's duchy in 1037, and effectively upheld his position, though he had to fight to do so. In 1064 Harold, then Earl of Wessex, and afterwards king of the Eng., was shipwrecked off Ponthieu and captured by William, who only released him on his promising to support W.'s claim to succeed to the Eng. throne on the death of Edward the Confessor, who had undertaken to nominate him as his successor. On the death of Edward in 1066 Harold broke his word and ascended the throne. W. without delay invaded England. He landed at Pevensey, near Hastings, on Sept. 28, and on the following Oct. 14 met and defeated the home army at a place since called Battle, in which encounter Harold was killed. Within the next few years he quelled rebellions in various parts of the country. In 1072 he invaded Scotland and compelled Malcolm to pay homage to him. Three years later he went to Normandy to suppress insurrections that sprang up during his absence. He met with his death as the result of an accident when riding. W. the Conqueror was a brave man, a capable soldier, and an able administrator. It was during his reign and at his instance that the survey was made, the results of which were entered in the Domesday Book. See F. H. Stenton, *William and the Rule of the Normans*, 1908; S. H. Benton, *From Coronet to Crown*, 1926.

William II., commonly known as **William Rufus** (1056-1100), King of England, was the third son of William the Conqueror, and succeeded to the throne on the death of his father in 1087. His eldest brother, Robert, was Duke of Normandy, and in 1091 W. invaded the duchy, but, being granted certain rights, co-operated with Robert against his Fr. neighbours. W. was cruel and grasping, and hated by his subjects, who cer-

tainly did not mourn his death, which resulted from his being shot by Walter Tirel when hunting in the New Forest. See E. A. Freeman, *The Reign of Rufus*, etc., 1882.

William III. (1650-1702), King of England, Scotland, and Ireland, was the posthumous son of William II., Prince of Orange, and Mary, daughter of Charles I. and Princess Royal of England. At the age of twenty-two he was appointed captain-general of the Dutch forces, and, not long after, stadtholder. He was in the main responsible for the direction of the war against France, and as commander, though not always successful, he showed an indomitable spirit. Perhaps the most far-reaching event of his life was his marriage in 1677 to Mary, daughter of James, Duke of York, afterwards James II., King of England. When the Eng. folk were estranged from James II., overtures were made to W. to invade England. These he accepted, and landed with a small force near Torquay on Nov. 5, 1688. On the flight of James II., the throne was offered to Mary, but William declared that unless he was made joint-monarch with his wife, he would withdraw to Holland. He was crowned with Mary in April 1689. In the following year he defeated James II. at the Battle of the Boyne, and having conquered Ireland proceeded to subdue Scotland. He went to Holland in 1793 and commanded the Dutch army. He d. from the effects of an accident while riding at Hampton Court. Shortly before his death he gave the royal assent to the Act of Settlement, which secured the throne ultimately to the House of Hanover. See H. D. Traill, *William III.*, 1888; G. H. Guttridge, *Colonial Policy of William III. in America*, 1922; M. Bowen, *William, Prince of Orange*, 1928.

William IV. (1765-1837), King of Great Britain and Ireland, was the third son of George III. and Charlotte Sophia, Princess of Mecklenburg-Strelitz. He went to sea in 1780, and in five years was promoted captain. He was created Duke of Clarence in 1789. Shortly after this dignity was conferred upon him, he contracted an intimacy with the pretty actress, Dorothea Jordan, with whom he lived for twenty years, and by whom he had several children, to whom the surname of Fitzclarence was given. In the interests of the royal succession he married in 1818 Adelaide, eldest daughter of George, Duke of Saxe-Coburg-Meiningen, but there was no issue of this alliance. He was appointed Lord High Admiral in 1827 and three years later, on the death of George IV., succeeded to the throne.

He was a man of homely talents, boisterous, tactless, but good-hearted, and occasionally as king showing unexpectedly sound common sense. See P. Fitzgerald, *Life and Times of William IV.*, 1884.

William I. (1772-1843), King of the Netherlands (1815-40), the son of William V., last stadtholder of the Dutch republic, b. at The Hague. He fought in the war against France (1793-95), and on the defeat of Holland served in the Prussian and Austrian armies until 1813. At the Congress of Vienna Belgium was united with the Netherlands into one kingdom, and in 1815 W. was proclaimed king. Belgium shook off the yoke in 1832. In 1840 W. abdicated in favour of his son, adopted the title of Count of Nassau, and d. in Berlin.

William I. (1797-1888), King of Prussia and Emperor of Germany. He was responsible for the absolutist and autocratic ideas which have pervaded the rule of the imperial house of Germany. He found in Bismarck a minister anxious to govern according to his own view, and it may be said that between them they had a large part in the making of pre-war Germany. During the Franco-Prussian War W. commanded the Prussian army and led his soldiers to the victories of Gravelotte and Sedan. He was proclaimed Emperor of Germany in the Palace of Versailles on Jan. 18, 1871. See biography by A. Forbes, 1888; also Ed. Simon, *William and his Reign*, Eng. trans. 1886; P. Wiegler, *William the First*, Eng. trans. 1929.

William II. (Friedrich Wilhelm Victor Albert), last Ger. emperor and king of Prussia; b. Jan. 27, 1859, at Berlin; eldest son of the Crown Prince Frederick (afterwards Frederick III.) and of Victoria, Princess Royal of Great Britain; and grandson of William I. An accident at birth rendered his left arm useless. He received a sound military training, and in 1885 had risen to the rank of colonel in the Hussars of the Guard. He married the Princess Auguste Victoria of Schleswig-Holstein, Feb. 27, 1881: there were six sons and one daughter. On the death of his father he succeeded as ninth king of Prussia and third Ger. emperor, June 15, 1888. His first action after accession was to pay a round of visits to European countries, including those that had recently been hostile to Prussia. His obvious intention of reducing the Chancellor to a mere instrument of his own will led to Bismarck's resignation, March 20, 1890. W. like Bismarck, disliked parliaments and relied on the army. W.'s chief ambition was to strengthen

Germany's power in Europe by colonial expansion. In his endeavours to widen Ger. influence, he visited Abdul-Hamid in Constantinople, in 1889 and 1898; and, while maintaining the Triple Alliance (*q.v.*), he tried for some years to cement a friendship with Russia. He was a frequent and welcome visitor to England until 1895. Eng. people resented his congratulatory telegram to President Kruger after the Jameson Raid, 1896; but W. later refused to receive the exiled Kruger. He regarded the Anglo-Japanese alliance as treachery to the white race, was disgusted and infuriated by the growth of Ger. socialism, and spoke of God as his ally. Relations with Britain had improved by 1907; but an interview W. granted to the *Daily Telegraph* in 1908, concerning naval co-operation, embroiled him with his own subjects, and for a while he had to exercise reticence. During the Morocco difficulty of 1905 he had made bombastic speeches about Germany's destiny; he now backed up Austria's annexation of Bosnia-Herzegovina; and, in a speech made in Vienna, Sept. 21, 1910, he promised that Germany would stand by Austria 'in shining armour.' He was at Kiel regatta on June 28, 1914, when news of the Sarajevo assassination reached him. His antiquated belief in the sacredness of royalty deprived him of all prudence; he pushed on preparations for war so openly that when, satisfied on July 28 by perusal of the Serbian reply, he thought all danger of war was over, Russia had mobilised and it was too late to prevent the conflict. At first he directed operations and selected the leaders; but after a few months he was virtually subordinate to Ludendorff and Hindenburg. On Oct. 3, 1918, he appointed Prince Max of Baden to the Chancellorship. In Nov. Prince Max demanded his abdication, and announced it as a fact on the 9th. W. was really deposed while he (at Spa, whither the military chiefs had smuggled him) was haggling for retention of the kingship of Prussia. He crossed the Dutch frontier, and was interned. He thenceforth resided at Doorn Castle. There was at first loud talk, especially in England, of bringing him to trial; but, as the peace-temper revived, the idea of holding an individual responsible for the War took on an aspect of absurdity that killed the project. Besides, it was always hard to take W. seriously, whether as a monarch, as a poet and musical composer (in *Sang an Ägir*, 1894), or as a cartoon-artist ('Yellow Peril'). W.'s empress having d. April 11, 1921, he married, Nov. 5, 1922, the

widowed Princess Hermine of Schon-aich-Carolath. See *My Memoirs*, Eng. trans. 1922; *My Early Life*, Eng. trans. 1926; also K. Rosner, *The King*, Eng. trans. 1922; E. Ludwig, *Kaiser Wilhelm II.*, Eng. trans. 1926; Empress Hermine, *Days in Doorn*, 1928.

William IX. (1071-1127), Duke of Aquitaine and Count of Poitou, and an early Provençal poet; succeeded to his hereditary estates in 1087. He went on a crusade in 1100 and reached Jerusalem, but was shipwrecked on his journey home. He was wild and gay and fond of warfare. Besides assisting the King of Aragon against the Moors and Louis the Fat against the Gers., he made inroads upon Toulouse and plundered Normandy. His songs are valuable to the student, being the earliest extant poems of the Romance school. See Mahn's *Die Werke der Troubadours*, vol. i., 1846.

William and Mary College, Williamsburg, Virginia, U.S.A., an institute of higher learning, founded in 1693. It is a state institution, and in 1931 had about 1400 students with 70 instructors, and there is also an enrolment of nearly 2000 students in extension classes in Norfolk, Richmond, and Newport News. The library has over 60,000 volumes. The Phi Beta Kappa was founded here in 1776.

William of Champeaux (c. 1070-1121), a Fr. philosopher, the founder of scholastic realism. He set up a school of logic in Paris, which was attended by Abelard (q.v.), his future rival. In 1113 he became Bishop of Châlons-sur-Marne.

William of Jumièges, see JUMIÈGES.

William of Malmesbury (c. 1095-1143), an Anglo-Norman chronicler, became a monk in the monastery at Malmesbury and inter-librarian and precentor. His *Gesta Regum Anglorum* gives the history of the kings of England from the Saxon Invasion to 1128. He also wrote *Gesta Pontificum Anglorum*, 1125 (revised 1135-40); *De Antiquitate Glastoniensis Ecclesiae*; an account of the church at Glastonbury; *Historia Novella* (a sequel to the *Gesta Regum*); and a *Life of St. Dunstan*. M. took part in the Council of Winchester against Stephen in 1141. See Stubbs' edition of *Gesta Regum Anglorum*, 1887-89.

William of Newburgh (1136-c. 1198), an Early Eng. historian, who wrote a *Historia Rerum Anglicarum* towards the end of the twelfth century. His history begins in the year of the Conquest and extends to his own time. See edition of the Rolls Series (1884). William was a monk of the

Augustinian priory at Newburgh in Yorkshire.

William of Orange, see WILLIAM III. OF ENGLAND; WILLIAM THE SILENT.

William of Wied (Wilhelm Friedrich Heiarich), Prince, ex-king of Albania; b. March 26, 1876, at Neuwied; second son of William (1845-1907), Prince of Wied. Educated at Jena. Nephew of Elizabeth ('Carmen Sylva'), Queen of Rumania, and from 1906 husband of a Rumanian lady, he was chosen, 1913, by the Powers, as first King of Albania. On March 8, 1914, he arrived at Durazzo. His Turkish Minister of War, Essad Pasha, resigned, and led a rebellion. After vicissitudes, William had to leave, Sept. 3. He was immediately succeeded by Burhan Eddin, a son of Abdul Hamid.

William of Wykeham, see WYKEHAM, WILLIAM OF.

Williams, Sir George (1821-1905), the founder of the Young Men's Christian Association, b. at Dulverton, Somersetshire. He went to London in 1841 and entered a drapery business, and, becoming very successful, was a personal factor of great good in an influential sphere during the Victorian era. He started the Young Men's Christian Association in 1844, and it was owing to him that Exeter Hall was secured for its headquarters. He was also interested in the Band of Hope Union.

Williams, Roger (c. 1600-83), the founder of Rhode Is., U.S.A., b. (probably) in London, though some authorities assert him to have been a Welshman, and was educated at the Charterhouse and Pembroke College, Cambridge. He joined the Nonconformists and in 1631 sailed for the New World in search of religious toleration. He preached at Salem (1631) and at Plymouth (1635), and in 1636 founded the city of Providence, where all true democrats might live. Here, too, he established the Baptist Church. He was president of Rhode Is. from 1654-57, and published many works, including *The Bloody Tenent* (1644), and *The Hired Ministry none of Christ's* (1652). See Club's edition of his works (6 vols., 1866-74), and *Lives* by Knowles (1833) and Elton (1852).

Williamsburg, the co. seat of James City co., Virginia, 48 m. S.E. of Richmond; it contains the William and Mary College (1693), and East State Lunatic Asylum (1769). It was the first capital of Virginia. Through the munificence of J. D. Rockefeller, Jr., it is now being restored to its former condition of 300 years ago. It has fisheries and manufs. lumber and woollen goods. Pop. (1930) 3700.

Williams College, Williamstown, Massachusetts, U.S.A., was founded in 1793 from a free school which owed its origin to Colonel Ephraim Williams. It is well endowed and has a large number of scholarships. The library contains over 125,000 books, and there are over a score of college buildings, besides a freshman dormitory completed in 1928. In 1931 the college had over 800 students and 82 teachers.

Williamson, Alexander William (1824-1904), Eng. chemist, b. in London. Educated at Heidelberg. Prof. of chemistry, University College, London. Did valuable research work in the uses of chlorine, and in the production of ether.

Williamsport, the co. seat of Lycoming co., Pennsylvania, U.S.A., is a well-built and imposing tn., standing in a pleasant country. It has manufs. of lumber, cars, motors, steel and iron goods, textiles, etc. Pop. (1930) 45,729.

William the Lion (1143-1214), succeeded his brother as King of Scotland in 1165. He was the grandson of David I. Henry II. of England refused to return Northumberland to Scotland, and so William made an alliance with France against England in 1168. In 1174 W. invaded England in alliance with Henry's own sons, was defeated at Alnwick, and sent as a prisoner to Falaise in Normandy. By the Treaty of Falaise he was liberated, but he agreed to do homage to Henry for Scotland and all his other territories. He returned to Scotland in 1176, founded a monastery at Arbroath, 1178, and made the Church of Scotland independent of that of England. By the Treaty of Canterbury between him and Richard I. the independence of Scotland was recognised on payment of 10,000 marks.

William the Silent, Prince of Orange (1533-84), the founder of the Dutch republic, the eldest son of William, Count of Nassau, was b. at Dillenburg in Nassau. In 1544 he succeeded a cousin in the principality of Orange and estates in Flanders and Holland, and before he was twenty-one Charles V. appointed him general-in-chief of the army and stadtholder of Holland, Utrecht, and Zeeland. In 1569 Henry II. of France, thinking him to be in the confidence of Philip II., told him of the Spanish plot to crush out Protestantism in the Netherlands. He did not betray his ignorance and his anger by word or look, and was henceforth known as 'the Silent.' In 1567 he placed himself at the head of the national rising against Spanish persecution, and openly embraced Protestantism. He was at first

defeated by Alva, largely through want of means, but in 1579 he established the union of the seven northern provs. He was assassinated by Balthazar Gerard, an agent of Philip II. See Motley's *Rise of the Dutch Republic*; *Cambridge Modern History*, vol. iii.; and Lives by F. Harrison (1897) and Ruth Putnam (1911).

Willibrord (or Willebrod), Saint (c. 657-738), an apostle of the Frisians, b. in Northumbria, and brought up in a monastery at Ripon. After studying and preaching in Ireland (677-90), he sailed for Friesland (690) where he made many converts. Pope Sergius I. ordained him bishop, and about 695 he became archbishop of Utrecht.

Willimantic, a city, Windham co., Connecticut, U.S.A., 16 m. N.W. of Norwich, has manufs. of textiles, paper, tin, and iron goods. Pop. (1930) 12,100.

Willington, Freeman Freeman-Thomas, Viscount, British administrator, b. Sept. 12, 1866; son of Frederick Freeman-Thomas and grandson of the first Viscount Hampden, celebrated as 'Mr. Speaker Brand.' Aide-de-camp to Lord Brassey when Governor of Nigeria, 1895; entered parliament as Liberal member for Hastings in 1900; for Bodmin in 1906. Junior Lord of the Treasury from 1905 to 1912. Was raised to the peerage in 1910. Received the G.C.S.I. in 1924 and raised to a viscounty. Succeeded Lord Byng as Governor-General of Canada, 1926. Received G.C.M.G., 1926; succeeded Lord Irwin as Governor-General of India in 1931.

Willis's Rooms, see ALMAACK'S.

Williston, Samuel Wendell (1852-1918), American palaeontologist; b. July 10, in Boston, Mass. Graduated, Kansas Agricultural College, 1872; M.D., Yale, 1880. Professor of anatomy, Yale, 1886-1900. Professor of historical geology and anatomy, and dean of medical school, University of Kansas, 1890-1902. Afterwards, professor of palaeontology, University of Chicago. Assistant palaeontologist, U.S. Geological Survey, 1882-85; assistant editor, *Science*, 1885-86; Health Officer, New Haven, Conn., 1888-90. Pub.: *Manual of North American Diptera*, 1896; *Reports on University Survey of Kansas*, vols. iv. and vi., 1898, 1900; *American Permian Vertebrates*, 1911. Died Aug. 30.

Will-o'-the-Wisp, see IGNIS FATUUS.

Willow, a name given to those members of the genus *Salix*, which are not osiers or sallows. They grow readily on damp soil and the Huntingdon or white W. grows rapidly to a height of 70 or 80 ft., and is a useful timber tree, as, too, is the Bedford

or Russell's W. But the most commercially valuable is the cricket-bat W., a variety which originated in Norfolk, Eng.

Willow Wren, *see* WARBLERS.

Wills, William Gorman (1828-91), an Irish playwright, *b.* at Kil-murry. Having studied in the Royal Irish Academy he came to London and took up portrait painting, but ultimately turned his attention to literature. He wrote novels and plays, and being considerably gifted with the dramatic instinct won some fame, especially with his plays. The chief are: *The Man o' Airie*, 1866; *Charles I.*, 1872; *Eugene Aram*, 1873; *Maria Stuart*, 1874; *Sappho*, 1875; *Jane Shore*, 1876; *Olivia*; *Nell Gwynne*; *Sedgemoor*; *Claudian*, 1885.

Wills, William John (1834-61), an Australian explorer, *b.* at Totnes in Devonshire, Eng. He emigrated to Victoria in 1853, and became surveyor of the crown lands (1855) and assistant at the magnetic observatory at Melbourne (1858). With O'Hara Burke (*q.v.*) he explored the interior (1860-61), but all the men but one of the expedition perished for lack of provisions near Cooper's Creek. His journal of the expedition was edited by his father, under the title *Wills' Successful Exploration through the Interior of Australia*, 1863.

Wills and Testaments. The power of making a will or testament of personal property (*see* PERSONALTY; PERSONAL PROPERTY) has existed in England from very early times, but for centuries the common law and feudal archaisms operated to prohibit the disposition of land by will, and the power to make a will of lands was only acquired through the equitable doctrine of uses and trusts after much legislation and considerable conflict between the courts of common law and equity (*see* LAND LAWS; USES). At common law a will might be nuncupative (*see* NUNCUPATIVE WILL), but at the present day the combined effect of the restrictions as to oral wills and testaments, and the requirements of the Wills Act, 1837, is to make it essential in practically every case to employ writing. Most wills, including codicils (*q.v.*), to be valid must be signed at the end of the will by the testator, or some other person in his presence, and by his direction, and such signature must be either made or acknowledged by the testator in the presence of at least two witnesses present at the same time, and such witnesses must attest the will in the presence of the testator. Any instrument executed in the above manner may take effect as a will, provided the intention was that it should not operate till after the

death of the donor; and again, a duly executed instrument, described as instructions for a will, may have effect as such, if it is apparent that it was intended to take effect in the absence of a more formal instrument. Any alteration in a will, made after its execution, must itself be executed in the same way as a will, but an alteration is sufficiently executed if the testator and the witnesses sign their names in the margin, or in some place opposite, or close to, the alteration; or sign a memorandum at the end of the will referring to the alteration. Alterations not duly executed can, however, be validated by a codicil, confirming the will (*see also* EVIDENCE). A will is in all cases revocable, even though the testator may expressly declare it to be irrevocable. Every will is now construed with reference to the estate, real or personal, comprised in it, to 'speak from death' or, in other words, to take effect as if it had been executed immediately before the death of the testator, unless a contrary intention appears by the will; which last words, however, only relate to the question of *what* property passes by the instrument, and do not mean that whatever the testator says in his will is to be interpreted as if the will were made on the day of his death. As regards personal property there is no restriction as to what a person may bequeath by his will, whether his interest in such property be one that is then actually vested, or only contingent or executory; and a person may validly dispose of property acquired subsequently to the making of his will. As regards land it is to be noted that the restrictions on testamentary disposition are only such as arise from the limitations of the particular subject-matter (*see* ESTATE; LIMITATION OF ESTATES; LAND LAWS; and SETTLEMENTS); there is nothing to prevent a person from devising land to which he is absolutely entitled in fee simple; but of course if he have no more than a freehold interest for his own life he will have nothing to dispose of at his death in default of some power of appointment vested in him (*see* POWER). Every person of sane mind, except an infant (*q.v.*), can make a valid will; and every person of age can be an attesting witness, including a creditor, or an executor; but where the will purports to make a gift to the spouse of an attesting witness, the attestation is good, but the gift void. A will is revoked by a subsequent will or codicil; or by a writing declaratory of an intention to revoke and duly executed like a will; or by destruction, burning, tearing, cancellation,

etc., provided there was an intention to revoke by such destruction, etc., or by marriage of the testator, subsequent to the date of the will (this does not apply to wills made in exercise of a power of appointment). The only way to revive a revoked will is to re-execute it, or to make a codicil showing an intention to revive it. By Lord Kingsdown's Act, no will or testament shall be held to be revoked or to have become invalid, nor shall its construction be in any way altered, by reason of any subsequent change of domicile (*q.v.*) of the person making the same. Where a beneficiary under a will predeceases the testator, the gift lapses except in certain cases (*see LAPSE*). A bequest or devise to two or more persons by name or by a general description of them as a class (*e.g.* 'the nephews of X') is construed as a joint gift (*see also* JOINT TENANCY), and where any of the joint donees predeceases the testator, their shares go to the surviving joint donees. On the other hand the donees will take 'in common' (*see* COMMON, TENANCY IN) if the testator has used words implying separate interests (*e.g.* 'equally,' or 'among'). But a gift to a class, even though as tenants in common, *e.g.* a bequest of '£10,000 to the children of X in equal shares,' will be construed as a gift to such of the children of X as shall be living at the death of the testator, and the predecease of any one of them does not cause a lapse.

A person, as noted above, must be of sound mind if his will is to be valid; this means that he must have an 'understanding of the nature of the business in which he is engaged, recollection of the property he means to dispose of, of the persons who have a claim to be the objects of his bounty and the manner in which it is to be distributed'; and where he is subject to delusions with regard to persons who would be the natural objects of his bounty, his will, while he is under the influence of such delusions, is invalid. Delusions, however, that leave the general power of understanding unaffected and which are in no way connected with the testator's testamentary dispositions, will not affect his capacity to make a will (*Theobald on Wills*). (*See also* UNDUE INFLUENCE.) In Scotland the law as to wills and testaments is very similar in effect. Prior to 1868 the most clearly expressed will not only was ineffectual to dispose of land, but was not even held to impose any obligation on the heir (*see* INHERITANCE) to implement (*q.v.*). Since 1868 anyone not under any specific disability can settle his heritable (*q.v.*) and movable property upon whom he

pleases, excluding his legal successor, by a testament or will, or by any instrument which may properly be called a will. The term 'will' is not a technical one in Scots law, and means merely 'any written declaration of what a person wills to be done with his movable estate after his death.' It therefore embraces all forms of deeds granted in anticipation of death, besides testaments. The term 'testament' is the proper technical term for what in Eng. law is called a will. Formerly it was not competent to anyone to dispose of his *land* by *testament*, but since the Act of 1868 above noticed, that restriction has ceased to exist, with the result that the terms will and testament are virtually synonymous. The Wills Act, 1837, does not apply to Scotland, but so far as form is concerned, there is no great difference between a Scottish and an Eng. will, except that a holograph will requires no attestation, though every other kind of will does. By an Act passed in 1918, removing doubts on the construction of section 11 of the Wills Act, 1837, it was affirmed that the Act of 1837 always has authorised that any soldier being in actual military service, or any mariner or seaman being at sea, may dispose of his personal estate as he might have done before 1918, *i.e.* free from the formalities, such as they are, prescribed by the Act of 1837—though under the age of twenty-one. Section 11 of the Act of 1837 is, however, extended by the Act of 1918 to any member of the naval or marine forces, not only when at sea but when so circumstanced that, if he were a soldier, he would be in actual military service. Further, a disposition of real property by a soldier or sailor is valid though not in legal form and though the testator was under twenty-one. Though a will is not required by law to be made in any particular form, more or less common forms have been evolved in process of time. The Law of Property Act, 1925, provides that the Lord Chancellor may prescribe forms to which a testator may refer in his will, but that unless so referred to, such forms are not to be deemed incorporated in a will. Such an Order has already been made under that provision (Statutory Will Forms, 1925; Statutory Rules and Orders, 1925, No. 780). *See* HOLOGRAPH; *see also* EXECUTOR; PROBATE.

In the U.S.A. the general age of testamentary capacity is eighteen. By the constitutions of many states laws giving effect to informal or invalid wills are forbidden. In some states children cannot be disin-

herited without good cause. Holograph wills are in use. Two witnesses are necessary and, as in England, wills of soldiers and sailors are privileged.

Will's Coffee House, a famous convivial resort in Russell Street, London, in the eighteenth century, originally called 'The Red Cow,' then 'The Rose.' Dryden first made it famous among the wits of the period, and after his death it was frequented by Pope. See COFFEE HOUSES.

Wilmington: (1) Co. seat of New Castle co., Delaware, U.S.A., on the Delaware R., 27 m. S.W. of Philadelphia. Among its notable buildings are the Old Swedes' Church (1698), Ferris Industrial School, and Friends' School. Its manufs. include vulcanised fibre, glazed kid, rubber hose, paper, machinery, railway carriages, and leather. There are large ship-building yards. See Powell's *Historic Towns of the Middle States*, 1899. Pop. (1930) 106,597. (2) Co. seat of New Hanover co., N. Carolina, U.S.A., on the Cape Fear R., 20 m. from the sea. It has cotton-seed oil mills, naval stores, dye works, lumber mills, and is a centre for petroleum products and a port of entry. Pop. (1930) 32,270.

Wilmot, David (1814-68), an American legislator, b. at Bethany in Pennsylvania. He began to practise as a barrister at Wilkesbarre in 1834, and represented Pennsylvania as a Democratic member in the Congress (1845-51). He was the author of *Wilmot's Proviso*, by which he opposed the introduction of slavery into the new territory the U.S.A. was about to acquire as a result of its war with Mexico. It was not adopted. He sat in the Senate (1861-63), and was appointed judge in the Court of Claims (1863-68).

Wilmot, John, see ROCHESTER, JOHN, second EARL OF.

Wilno, or **Vilna**, a prov. of Poland, bounded in the S. by the prov. of Nowogrodek and in the E. by Lithuania, the N. by Latvia and the W. by Russia. Area 11,000 sq. m., consists of an extensive plain broken with low hills. The low land is marshy, and the country is covered with forest. The soil is sandy, and the chief occupation is agriculture. Rye, barley, wheat, oats, hemp, and flax are grown, and timber and furs exported. Pop. 1,000,000, comprising Poles, White Russians, and Lithuanians, almost two-thirds of the pop. being Poles. The chief towns of the prov. are Wilno (Vilna), Widze, Syentsyany, Disna, Wilejka, Nyemchin.

Wilno, Vilna, or **Vilnius**, a tn. of Poland, cap. of the prov. of W., on

the Viliya R., near the junction of Libau-Don, Leningrad-Warsaw, and Libau-Odessa railways. An old tn., it contains an imperial palace, the cathedral of St. Stanislaus (1387), the cathedral of St. Nicholas, built 1596-1604, besides a valuable museum of antiquities, and various other buildings of historical interest. It has a university, founded in 1578. It is an important centre for timber and grain, which are exported, and an archiepiscopal see of the Orthodox Gk. Church. Pop. (1921) 128,954. In the thirteenth century W. was the cap. of Lithuania, but after the union of Lithuania and Poland during the reign of Casimir IV. (1427-92), the tn. became a centre of Polish culture. In the seventeenth century, when Poland was attacked by Sweden, Russia, and Brandenburg, W. was taken, and finally in the third partition of Poland the prov. of W. became a Russian Gov. with W. as its capital. During the Great War W. was taken by the Gers., but in 1918 changed hands between the Lithuanians, Russians and Poles, being taken a second time by the Russians on Jan. 5, 1919, during the war with Poland. The Russians finally abandoned W. to the Lithuanians, whose claim to the tn. was supported by the Soviet Gov. The so-called 'Curzon Line' which fixed the E. boundary of Poland, July 1920, excluded W. from Poland. Poland recognised the Lithuanian occupation of W., but on Oct. 9, 1920, the tn. was occupied by a Polish 'rebel' general, Zeligowski, whose action was officially repudiated by the Polish Gov. although later Pilsudski confessed to his active sympathy with the project. The war between Poland and Russia was ended by the Treaty of Riga, March 18, 1921, which fixed the E. frontier of Poland to include the W. territory. Zeligowski set up an independent state, called Central Lithuania, and meanwhile the League of Nations engineered a conference between Lithuania and Poland at Brussels, April 1921, with Hymans as President. Hymans proposed that Lithuania should be organised into two self-governing cantons, Kovno and Wilno, with W. as their cap., and united with Poland by political, military, and economic treaties. This proposal was rejected by Lithuania, although accepted in principle by Poland. Zeligowski did not withdraw from W. until Nov. 30, 1921, leaving Meystowicz in charge of the gov. there. The W. Seym or Constituent Assembly was elected on Jan. 8, 1922, and on Feb. 20 passed a resolution in favour of the complete absorption of W. in Poland. An

Act of Incorporation between Poland and W. was signed on March 22, 1922. The Ambassador's Conference which met in March, 1923, finally delimited the E. boundary of Poland to include W. recognising the frontier determined by the Treaty of Riga. The Lithuanian Government continued to protest and maintained for some time a 'state of war,' resulting in several border incidents, but a Polish-Lithuanian Conference, held at Königsberg Nov. 1928, came to nothing, and Poland has remained in possession of W. See R. Machray, *Poland 1914-1931*, 1932. See also POLAND.

Wilson, Henry (1812-73), vice-president of the U.S.A., b. at Farmington, New Hampshire. He was for a time a shoemaker, but in 1840 was elected to the Massachusetts legislature and state senate, entering the U.S. Senate in 1855. He was chairman of the important committee on military affairs during the Civil War, and in 1873 became vice-president with Grant. His chief work was *History of the Rise and Fall of the Slave Power in America*, 1872-75; but he also wrote *Anti-Slavery Measures in Congress*, 1864; and *Military Measures in Congress*, 1868.

Wilson, Sir Henry Hughes (1864-1922), British soldier. Educated at Marlborough. Began his military career with a commission in the Royal Irish Regiment (1884), transferring the same year to the Rifle Brigade. Served in the Burmese Expedition (1885-89). Appointed staff-captain of the Intelligence Division (1894). He was then promoted to brigade-major and served in the S. African War from 1899 to 1900 as brigade-major of the Light Brigade, and then as D.A.A.G. at headquarters in S. Africa. He was present at the actions of Laings Nek, Tugela Heights, Colenso, Vaalkranz, and participated in the operations for the relief of Ladysmith. Became D.A.A.G. at Army Headquarters for Military Education (1903); Assistant-Director of Staff Duties (1904-06); Commandant of the Staff College (1907-10), and Director of Operations (1910-14). In the Great War he went to France as Assistant-Chief of the General Staff to General French, and later became Grand Officer of Liaison with the Fr. higher command, being in close collaboration with General Foch. Was then appointed to be G.O.C. Eastern Dist. at home (1917). Became British Military Representative at Versailles on the War Council (1917), and then Chief of the General Staff at the War Office. Knighted in 1915. Won a high reputation as a staff officer from his activities in the creation of the new

School of Staff Officers. Took a large part, as Director of Operations, in the arrangements for bringing the British Expeditionary Force so promptly into action in 1914. Regarded rather as a shrewd teacher and strategist than as a leader. Credited with much foresight in anticipating the war with Germany. In collaboration with Generals Castelnau and Foch he prepared the Anglo-Fr. military agreements in 1912. Promoted Field-Marshal in 1919. He was a strong supporter of Mr. Lloyd George's policy of unity of command on the Western Front and advocated the appointment of his former collaborator Foch. After the Russian Revolution he tried, as one who believed in obtaining a decision in the East, to restore the Russian front. For his services in the War he received a baronetcy and a parliamentary grant of £10,000. Was appointed Chief of the Imperial General Staff in 1919, afterwards entering the House of Commons as member for North Down, when he figured as an unsparing critic of the gov. for its Irish policy. His denunciations, however, rendered him anathema to Irish conspirators, and in June 1922, after returning from unveiling a war memorial to railwaymen at Liverpool Street Station, he was shot by two men outside his tn. house. His *Life and Letters* were pub. by Sir C. E. Callwell in 1927.

Wilson, John (1785-1854), Eng. author, wrote under the pseudonym of 'Christopher North.' Educated at Oxford, where he won the Newdigate Prize in 1806. He settled at Ellerray on Windermere, and led the life of a country gentleman, but losing his fortune in 1815, owing to a dishonest trustee, he was in that year called to the Bar. The law, however, made no appeal to him, and it was to literature that he turned to provide him with a living. Already in 1812 he had pub. a volume of poetry, *The Isle of Palms*, and in 1816 he issued *The City of the Plague and other Poems*. With the establishment of *Blackwood's Magazine* in 1817 W. came into prominence. He was one of the original staff and a regular contributor. In 1820 W., for no other reason than that he was a Tory, was elected to the chair of moral philosophy at Edinburgh University. In *Blackwood's* appeared his *Lights and Shadows of Scottish Life* (1822), *The Trials of Margaret Lindsay* (1823), *The Foresters* (1825); but it is as the chief author of the *Noctes Ambrosianae* that he is best remembered, and in those papers he displayed to the full his admirable literary gifts. His works were collected in 1855-58 by his son-

in-law, Professor Ferrier; and there is a biography by his daughter, Mrs. Gordon (1862).

Wilson, John Mackay (1804-35), an Eng. writer, b. at Berwick-on-Tweed. He became editor of the *Berwick Advertiser* (1832), pub. *Tales of the Borders* (1834-35).

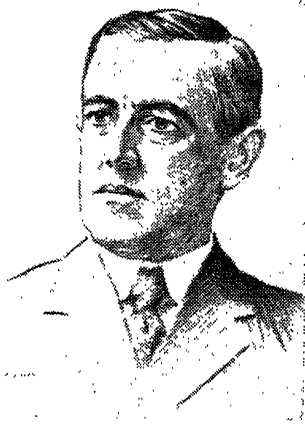
Wilson, Richard (1714-82), an Eng. painter. A native of Penegoes, Montgomeryshire, he studied art in London and afterwards in Italy. He was among the original members of the Royal Academy, founded in 1768, while subsequently he was appointed librarian to that body; yet his pictures were but little in demand during his lifetime, and it was not till many years after his death that he became recognised as one of the greatest Eng. masters of landscape painting. There are numerous works from his brush in the National Gallery, while there are several in the Glasgow Municipal Museum and others in the National Gallery of Scotland.

Wilson, Thomas (c. 1525-81), a secretary of state and critic, b. in Lincolnshire. He was educated at Eton and Cambridge, where he came under the influence of the revival of the study of Gk., led by Cheke, Sir Thomas Smith, and others. His first important work was *The Rule of Reason* (1551), and this was followed by *The Arte of Rhetorique* (1553), 'the first criticism in our language.' From 1555 to 1560 he was on the Continent, and on his return was admitted advocate in the Court of Arches. He was M.P. for Michael Borough (1563-67) and for Lincoln (1572-81) and in 1578 was made a privy councillor and secretary of state. He was also employed on various diplomatic missions, especially to the Netherlands. He pub., besides the works above mentioned, *The Three Orations of Demosthenes* (1570), the earliest Eng. translation from Demosthenes.

Wilson, (Thomas) Woodrow (1856-1924), 28th President of the U.S.A., was b. at Staunton, Virginia, Dec. 28. His paternal grandfather was b. in Ulster. His maternal grandfather was b. in Glasgow. He was, therefore, predominantly what Americans call 'Scotch-Irish,' a mixture which throughout the history of the U.S.A. has played a great part. His father was a Presbyterian preacher—stern, but just and humane. Woodrow Wilson, as he chose to be called, spent the early and formative years of his life in Georgia and S. Carolina and so saw something of reconstruction in the S. after the Civil War. He graduated from Princeton University in 1879, where he not only established a reputation as a good scholar, de-

bater, and writer, but was also student director of athletics. He then graduated in law from the University of Virginia, practised for a short time at Atlanta, and then went to Johns Hopkins University, where he obtained his Ph.D. in 1886, having specialised in the study of gov. and history. His doctoral thesis was on Congressional gov. and was largely an attack on its methods. From 1886 to 1888 he was associate professor of history and political economy at Bryn Mawr College and from 1888 to 1890 held the same post at Wesleyan University. In 1890 he returned to Princeton University as professor of jurisprudence and political economy and in 1902 became President of Princeton, in which latter capacity he was soon engaged in his first big struggle. Princeton, originally a Presbyterian college marked by the simple life, had latterly become a university favoured by the sons of the rich, who largely monopolised the amenities. W. sought to restore the university to its former democracy, and was bitterly opposed by many of the faculty, by some of the student body, and by the wealthier *alumni*. Then, when the situation was becoming unpleasant for him, a new avenue of usefulness was opened to him. The Democratic party of New Jersey was seeking a gubernatorial nominee who might appeal to the people. The state had largely been controlled by the big corporations, and it appeared to the Democratic 'bosses' that with a man like W. for 'window-dressing' they might defeat the Republicans, who for so long had held the state. So, in 1910, he was nominated for Governor, made a diligent canvass of the state, and was elected by a plurality of over 49,000 votes. But what he had promised to the people he now as Governor proceeded to realise. He defied all the political bosses and pushed through the legislature all his reform legislation, including a Direct Primaries Act, Corrupt Practices Act, Employers' Liability Act, and the creation of a public utilities commission to curb the corporations. After a sharp fight he got through what were known as the 'Seven Sisters,' a series of Bills designed to protect the people from exploitation by the trusts. He now became an active candidate for the Democratic nomination for President, and, with the powerful help of W. J. Bryan (*q.v.*), who refused to support anybody backed by the New York bosses, W. was finally nominated on the 46th ballot. The Republicans nominated W. H. Taft, and the newly formed Bull Moose (*q.v.*) party named Theodore Roosevelt. Taft was admittedly out

of the running. It became a contest between Roosevelt, with his new nationalism, and W., with his new freedom. W. boldly announced himself in favour of tariff reform, currency reform, strict trust regulation, and the protection of the legitimate interests of organised labour. In Nov. he was overwhelmingly elected, as Roosevelt had split the Republican strength. The Democrats had also the control of both Houses of Congress. In his inaugural address the new President outlined a vigorous policy of reform and wound up with the peroration: 'Here muster not the



WOODROW WILSON

forces of party, but the forces of humanity . . . I summon all honest men, all patriotic, all forward-looking men, to my side. God helping me, I will not fail them, if they will but counsel and sustain me.' The old-line politicians thought here was another weak Buchanan in the White House. They used the term 'college professor' as a term of derision. When Congress met on April 7, 1913, W. revived a practice that had been abandoned for a hundred years. Instead of sending his message to Congress, he went to the Capitol and read it in person, and he kept up this practice during the greater part of his presidency. Gradually almost every part of his programme was pushed through to definite enactment. He summoned Congress to

construct a new tariff Bill, and the resultant Underwood Tariff Bill was the lowest since the Civil War. Then he asked Congress to pass a Federal Reserve Act, creating Federal Reserve banks to give the gov. the control of the nation's finances. It was the greatest piece of financial constructive legislation adopted since the days of Hamilton. Another great Act was the Clayton Anti-Trust Act, which incidentally gave organised labour its charter of freedom by providing that labour unions should not be considered unlawful combinations *per se*, and that strikes, boycotting, and picketing were not, as such, violations of law. Further controversy arose when W. asked Congress to repeal the Panama Canal Tolls Act, which provided that American vessels engaged in coastwise trading should be exempt from paying tolls; but W. insisted that this exemption was in conflict with a treaty with Great Britain and he had his way. Another bitter conflict arose when W. sent to the Senate the name of Louis D. Brandeis for a post as member of the U.S. Supreme Court. Brandeis was the first Jew ever nominated, but W., though urged to withdraw his name, refused, and the appointment stood. No administration in American history could point to finer domestic accomplishments. But W. was not quite so fortunate in his foreign policies. Opposed to dollar diplomacy, he nevertheless was compelled to permit the occupation of Haiti, the Dominican Republic, and Nicaragua by American marines. His greatest problem was Mexico. Francisco Madero had been chosen as president, but power was seized by Victoriano Huerta and Madero was murdered. W. refused to recognise the usurper. He adopted his much derided policy of 'watchful waiting.' When Huerta fled, Carranza and Villa both wanted to seize power. W. recognised Carranza as *de facto* President. Pancho Villa thereupon led his Indians in attack across the frontier. W. sent a force down to the border, where it was kept for years. All during this troublous period there were forces at work trying to get the country into a war with Mexico. At one time, when W. sent marines to occupy Vera Cruz, war seemed imminent, but Argentine, Brazil, and Chile offered to act as mediators and W. at once accepted. But now altogether greater events turned the country's attention in another direction. The Great War broke out, and it was immediately apparent that the U.S.A. was not so united. It was found that the old racial and national sympathies still existed. W. hated milita-

alism, and believed Germany was trying to establish its hegemony over the world. But apart from racial feeling in the U.S.A., it was the fixed policy of the country to remain free from entangling alliances and European wars. All that W. was called upon to do was to issue the neutrality proclamation usual in such crises. Further, he was hopeful that, after a time, the U.S.A. might act as mediator and bring the conflict to an end. He called upon his countrymen to remain neutral in thought and in deed. His first conflict came with England when she was tightening her blockade. When England began to detain American vessels destined for neutral ports, W. sent a sharp Note of protest. England replied she would repair any injury done. W. returned to the charge in October 1915, declaring the blockade illegal and indefensible. The British Cabinet then took steps to ameliorate the situation, difficult as it was for all concerned. W. was then free to bring pressure to bear on Germany in regard to her submarine campaign. On May 7 came the tragedy of the *Lusitania*. Of the 1152 persons drowned, 114 were Americans. Germany sent a lame apology to the U.S.A. W. replied in a Note calling upon Germany to disavow the act, make all possible reparation, and take steps to prevent a recurrence of such deeds. The pro-Allies were deeply disappointed and resentful. From one of his speeches they tore loose from its context his phrase 'too proud to fight' and centred their fire on him. At about the same time he gave the Austrian ambassador his passports, it being established that he was seeking to foment strikes. Now came the election of 1916. W. was unanimously renominated by his party. C. E. Hughes was nominated by the Republicans. W.'s Mexican policy and his dealings with the belligerents in the Great War were alike subjects for powerful attack. The Republicans were confident, relying on the Ger. and Irish-American vote. But they reckoned without the Middle and Far W., to which the War was far more distant than to the people of the Atlantic seaboard. W. was re-elected. His 'peace without victory' address on Jan. 22, 1917, was his last effort to bring the War to an end by peaceful methods. On April 2, 1917, W. asked Congress to declare war, and Congress acted four days later. W.'s speech to Congress aroused the whole nation. It contained the historic phrase that 'the world must be made safe for democracy.' The nation followed him almost unanimously. It

submitted to conscription without a conflict. It oversubscribed the great bond issues. The main rift in the lute was some of the Republican politicians. Great Britain had a coalition gov. Republican newspaper organs began mooted the idea that W. should reform his cabinet and take in some Republicans. This he refused to do. The nation had entrusted the Democratic party with the power and he meant to use it. But, eschewing the tactics of a mere politician, he appointed John J. Pershing, a Republican, as head of America's armies. He called upon other Republicans to render great services—Herbert Hoover as food director, H. A. Garfield as fuel director, C. M. Schwab as head of the shipbuilding, E. R. Stettinius as supervisor of munitions production. But Republican animosity was intensified when W. refused to send General Leonard Wood to Europe, because Pershing did not want him, and when he refused to allow Roosevelt to lead a volunteer army corps to France. The story of the U.S.A.'s part in the War belongs to the history of the Great War (*q.v.*) and the U.S.A. (*q.v.*). When the War was ended and the peace conference was to meet at Versailles, W. startled the nation by announcing he would head it himself and go abroad. W.'s view was that if he sent a delegation too much time would be lost in cabling back to him for instructions. He had the confidence of the plain people of the whole world. They looked to him to see that his famous fourteen points (*q.v.*) were incorporated in the treaty. On Dec. 4, 1918, he sailed with the American delegation on the *George Washington*. The make-up of the delegation was also bitterly criticised. It has often been said that had he named leading Republican and Democratic Senators to go with him he would have achieved his object. In London, in Paris, and elsewhere W. was acclaimed as a great popular hero. No American ever received such ovations from the masses. But W. was doomed to bitter disappointment in the treaty negotiations. He found the statesmen of the Allied Powers already irrevocably agreed on many points. But with such men as Lord Robert Cecil and General Smuts he drew up the Covenant of the League of Nations. To his way of thinking that was more important than anything else, because he thought that any wrongs in the treaty could be rectified by the Covenant. He returned to America early in 1919 with the draft of the Covenant. He found a bitterly hostile Senate controlled by the Republicans. One of his

greatest foes, Senator H. C. Lodge, was chairman of the committee on Foreign Relations, which would have to deal with the completed treaty when he presented it for confirmation. With heavy heart he returned to Paris. He got the Covenant adopted with some slight amendments made out of respect to American opinion, but otherwise the treaty was largely unsatisfactory to him. On his return to America in July 1919 he at once declared that the text of the treaty and the Covenant of the League of Nations were inter-dependent and that one could not be adopted without the other. W. prepared to appeal to the people over the heads of the Senate. As the Press of the country is largely Republican, it had prepared the ground against him. For once in his life he met with a cool reception from the crowds. Never a strong man, he had a serious breakdown on Sept. 26 at Wichita, Kansas, and was taken back to Washington as quickly as possible. At long last a committee composed of one Democrat and one Republican was received by the sick President. The Republican confessed to his colleagues that, helpless as W.'s body might be, his mind was clear. Unable to fight, W. nevertheless intimated that he would accept a mild reservation to Article Ten of the Covenant. But as reported and voted on in March 1920 it contained stronger reservations than he had been willing to accept. His friends again defeated its passage and the matter was definitely ended. It is but fair to say that, as the controversy went on, the bulk of the people veered into opposition, because of the old-time feeling that the U.S.A. should in no way be entangled in foreign alliances or undertakings. But the Senate built in some ways worse than it knew. By going back on the signature of the American President it implanted in the chancelleries of all the world a fear that no President could guarantee that his signature would be honoured by the Senate. In the Presidential election of 1920 James M. Cox, the Democratic nominee, upheld the Covenant and the treaty as Wilson signed it. Senator Warren G. Harding, one of the Republican reservationists, who was the Republican nominee, continued his hostility. The election was looked upon as a plebiscite on the subject. Harding was overwhelmingly elected. Some consolation came to the sick President when in December 1920 he was awarded the Nobel peace prize. He lived on in Washington as a private citizen until he *d.* in his sleep, Febru-

ary 3, 1924. Even yet time has not softened the asperities, but W.'s place in history is secure. As a peace-time President, the record of his achievements ranks with the highest. As a war-time President he led the nation into the greatest of all wars and kept the administration free from graft and scandals. As truly as any soldier on the battlefield, he spent himself for what he thought was right. He never achieved the kind of popularity his great opponent, Roosevelt, once enjoyed. He had none of Roosevelt's expansiveness and robust vitality. Never a strong man, he had to conserve all his physical strength for the great tasks in hand. Very human, friendly, and humorous within the circle of his family and his few intimates, he did not suffer fools gladly. He struck the many as cold and aloof. But he really loved the people and was anxious to serve them. If he was aristocratic in his tastes, he was democratic in his belief and trust in the plain folk. See Ray Stannard, *Woodrow Wilson, Life and Letters* (4 vols. published).

Wilson Cloud Chamber. The essential features of this important piece of apparatus are shown in the accompanying diagram. C. T. R. Wilson

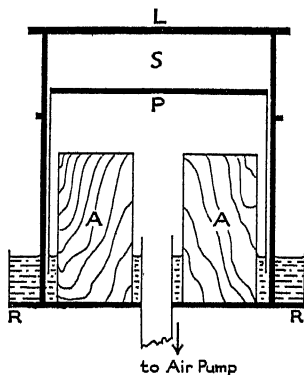


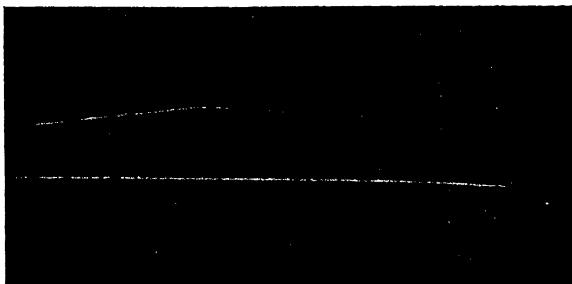
FIG. 1

designed the apparatus in order to obtain clouds in the space *S* by producing a sudden expansion of the air saturated with water-vapour contained in *S*. The vessel *L* is a glass cylinder closed at one end by a piece of plate glass, while the other end rests on the rubber floor *RR* of the

vessel containing water. P is a glass plate mounted on a thin brass cylinder to form a plunger that can move up and down inside the outer glass vessel. The wooden cylinders AA serve merely to reduce the volume of air beneath the plate P and therefore to facilitate the exhaustion of the space below P by means of an air pump. The series of operations is as follows: the plunger P is pushed up by increasing the pressure below it; a valve is closed and the pressure in the communicating receiver is greatly reduced. The receiver is then put into communication with the space below P by opening a valve, and the plunger falls suddenly and is held pressed against the rubber floor RR . The volume of the space S is thereby suddenly increased and the saturated air is cooled adiabatically. Wilton's

atom occupies a very small portion of the space occupied by an atom, hence the rarity of a collision between the α -particle and the nucleus; (ii.) the constitution of the nucleus is revealed by the deflection of the α -particle in the collision. The evidence of the W.C.C. experiments provides one of the most important links in the nuclear theory of the atom. See NUCLEUS; RADIUM.

Wilton, a market tn. and mun. bor., Wiltshire, England; has been celebrated for its carpets since the time of Elizabeth. It was the seat of a bishopric until 1075, and was the capital of Wessex. Wilton House, seat of the Earls of Pembroke, has mementoes of Sir Philip Sidney, Holbein, Vandyck, Ben Jonson, and Inigo Jones. W. gave its name to the co. Pop. (1931) 2195.



WILSON CLOUD CHAMBER

(From Pidduck's *Treatise on Electricity*.)

original form of apparatus has been modified by Shimizu, who arranged the plunger P to be the piston moving up and down by a reciprocating movement. The Shimizu-Wilson apparatus is driven by means of a motor, and it has been applied by Blackett for automatic photographic recording of the tracks of α -particles in air. The α -particles, from a particle of radium chloride, attached to the walls of the space S , produce intense ionisation of the air along their tracks. These ions serve as nuclei for the condensation of the supercooled water vapour in S , i.e. clouds form along the tracks of the α -particle. It is found that about 1 in every 10,000 tracks is like the one shown in the accompanying plate. This reveals the collision of the α -particle with the nucleus of an atom. The importance of the information derived from these experiments is: (i.) the evidence that the nucleus of an

atom occupies a very small portion of the space occupied by an atom, hence the rarity of a collision between the α -particle and the nucleus; (ii.) the constitution of the nucleus is revealed by the deflection of the α -particle in the collision. The evidence of the W.C.C. experiments provides one of the most important links in the nuclear theory of the atom. See NUCLEUS; RADIUM.

Wilton, a S.W. co. of England, bounded N. by Gloucestershire, S. by Dorsetshire and Hampshire, E. by Hampshire and Berkshire, and W. by Gloucester and Somersetshire. The surface is for the most part hilly, and includes Salisbury Plain (20 m. by 16 m.) in the S., some 400 ft. above sea-level, with the North Downs forming its northern border, and to the N.E. the Marlborough Downs and Saverlake Forest. The principal rivs. are the Kennet, the Lower or Bristol Avon, and the Salisbury Avon. There are also the Thames and Severn Canal, the Wilts and Berks Canal, and the Kennet and Avon Canal. Oats is the main crop; large numbers of sheep are reared, and a considerable area is under permanent pasture. Dairy-farming flourishes, and there are condensed-milk manufactories. Cheese and bacon are also made. At Swindon there are locomotive works belonging to the Great Western

Railway; at Devizes large engineering works; cloth and carpets are also manufactured at Trowbridge, Wilton, etc. There are iron mines near Westbury and Bath, and Portland stone is quarried. Salisbury (*q.v.*) is the co. tn. The co. returns five members to parliament. W. is famous for its antiquarian relics, especially the Druidical remains at Stonehenge and Avebury, while the camp of Vespasian near Amesbury is equally interesting. Wans Dyke is a relic of the Romans, and there are numerous ecclesiastical ruins of later periods, including the abbeys of Malmesbury, Lacock, and Edington. The Saxon church of St. Lawrence at Bradford-on-Avon is also notable. Salisbury Cathedral is a fine example of the Early Eng., and the parish churches are many of them of great interest. There are castle ruins at Old Sarum, Marlborough, and Devizes, and Wardour Castle, dating from the eighteenth century, has a fine collection of curios, including the famous 'Glastonbury Cup.' The area is 860,829 acs. Pop. (1931) 303,258. See *Victoria County History: Wiltshire*; E. Hutton, *Highways and Byways in Wiltshire*, 1917; M. Hewlett, *Stories of Wiltshire*, 1922.

Wiltshire Regiment (Duke of Edinburgh's), an Eng. regiment, formerly 62nd and 99th regiments. 62nd formed 1756 as 2nd Battalion to 4th Foot (now King's Own Royal Regiment (Lancaster)), but made a separate corps in 1758. Took part in defence of Canada and American War, 1776-77, fought in the Peninsula under Wellington, then went to West Indies and later to India, where it took part in First Sikh War. It was also in the Crimea. 99th raised 1824 and served in Mauritius, Australia, and later in New Zealand campaign of 1846-47. Took part in China War, 1860, and then went to South Africa. The regiments were linked in 1881 and served in South African War, 1899-1902. During Great War raised 12 battalions and served in France, Flanders, Macedonia, Gallipoli, Palestine, and Mesopotamia.

Wimbledon, a parl. and mun. bor. of Surrey, England. The annual meetings of the National Rifle Association were formerly held on Wimbledon Common (1860-89). It is the headquarters of the All-England Lawn Tennis Club. It has interesting remains of early British earthwork. W. sends a member to parliament. Pop. (1931) 59,520.

Wimborne Minster, a market tn., Dorsetshire, England, 6 m. N. of Poole; is an agricultural centre. The minster, dating from the Conquest, has a fourteenth-century lunar orrery. Pop. (1931) 3895.

Winchcomb, a market tn., Glou-

cestershire, England, has flour-mills, paper works, and tanneries. Queen Catherine Parr was buried here. The rural district of W. is part in Gloucestershire and part in Worcestershire. Pop. (1931) 8729.

Winchelsea, a parish and former Cinque Port of Sussex, England. Old Winchelsea, an important seaport in Saxon times, was destroyed by the sea about 1288. Pop. 150.

Winchendon, a tn., Worcester co., Massachusetts, U.S.A. Manufs. cotton goods, machinery, and furniture. Pop. (1930) 6202.

Winchester: (1) A cathedral city and mun. and parl. bor. of Hampshire, England, on the Itchen, 12 m. N.E. of Southampton. The Saxon kings of Wessex who made W. capital of England, are said to have been crowned in the old cathedral, of which no traces remain. The present cathedral was erected by Bishop Walkelin in the eleventh century. Additions were made by William of Wykeham and others, so that the styles of architecture vary from Norman to Perpendicular. It is the longest cathedral (557 ft.) in England, with a nave of 351 ft. It contains the tombs of Cardinal Beaufort, Izaak Walton, and Jane Austen, and a shrine to St. Swithun. Not far from the cathedral lie the ruins of Wolvesey Castle, and to the N. those of Hyde Abbey, in which King Alfred was buried. The county court is held in the hall of a mediæval castle on Castle Hill, which contains the famous relic known as 'Arthur's Round Table.' The College of St. Mary, better known as Winchester College, was founded by William of Wykeham in 1387. Pop. (1931) 22,970. See works by Dean Kitchin (*Historic Towns Series*, 1891); L'Estrange (1889); Leach, *History of Winchester College*, 1899; and *Winchester, its History, Buildings and People*; W. Lloyd Woodland, *Winchester* (*Mediæval Towns Series*, 1932). (2) A tn. of Middlesex co., Massachusetts, U.S.A., 8 m. N.W. of Boston. It has a Home for Aged People, State Aviary, State Park (known as 'Middlesex Fells'), and manufs. of felt and machinery. Pop. (1930) 12,719. (3) The cap. of Frederick co., Virginia, with manufs. of leather, paper, gloves, etc. It contains the Valley Female College and Fairfax Hall. Pop. (1930) 10,855. (4) A co. seat of Clark co., Kentucky, with manufs. of gasoline engines, flour, etc. It contains the Kentucky Wesleyan College. Pop. (1930) 8233.

Winckelmann, Johann Joachim (1717-68), a Ger. art critic, b. at Stendal in Prussia, the son of a poor shoemaker. Educated at Halle and Jena, he began life as a private tutor,

and in 1748 became librarian to Count von Bünau at Dresden. There he was converted to Rom. Catholicism by the pope's nuncio, at whose suggestion he settled in Rome. He made friends with the leading Italian painters and was librarian first to Count Archinti (1755), and then to Cardinal Albani (1759), finally becoming antiquary of the apostolic chamber (1763). He was murdered at Trieste by an Italian to whom he had shown some gold coins. W. was a great exponent of classic art, and is regarded as the founder of scientific archaeology. His chief works are *Geschichte der Kunst des Alterthums* (1764) and *Monumenti Antichi Inediti* (1767-68). See Goethe, *Winckelmann und sein Jahrhundert*, 1805; and *Life* by Justi (1866-73).

Wind. The Ws. or lateral movements of the earth's atmosphere are determined by the distribution of pressure within that fluid, movement taking place from high to low pressure indirectly. The theory of Ws. as worked out by Ferrel and others discusses primarily *planetary* Ws., those which would occur on a homogeneous planetary body on account of its relation to the sun and the distribution of radiation received. For the earth the results are supposed to be zones of calm—at the equator due to ascending air currents, near Cancer and Capricorn and at the poles due to descending currents. The intervening belts on either side of the equator have thus equator-seeking Ws.; on the polar sides of the tropical calms, pole-seeking Ws. Theory is, however, far from perfect, and the distribution and direction of Ws. at different levels in the atmosphere are extremely uncertain. Poleward Ws. are deflected to the E., equator-seeking Ws. to the W., by the influence of the earth's rotation. The atmosphere partakes of the earth's motion of rotation, and a W. has in its earliest course a component velocity corresponding to its latitude. On reaching different latitudes this becomes a defect or excess of that of the earth's surface it now passes over, and the W. 'lags' or 'leads'; the resultant course is thus curved. The trade Ws. blowing into equatorial low pressure are N.E. and S.E., curving more and more westwards. The Ws. blowing polewards from the tropical calms are N.W. or S.W., and curve more and more eastwards. In the S. hemisphere they are well developed as the Roaring Forties. The planetary Ws. swing N. and S. with the sun, but over much less latitude. *Terrestrial winds.*—The earth's surface is not homogeneous, but land and water are variously distributed. Land rises

and falls in temperature more rapidly than water, and as pressure varies oppositely to temperature, a definite disturbance of planetary Ws. is caused. The tendency is for Ws. to blow into the continents in summer and out from them in winter. This is established only over Eurasia to any general extent, but it is markedly so on the S. and E. of Asia, where the trade Ws. are reversed in summer and blow landwards, the trades of the S. Indian Ocean obliterating the doldrums and joining the S.W. monsoon, as the reversed Ws. are called. These *periodic* Ws. form a separate class from the *prevailing* Ws., which are constant throughout the year. Marked deflection of planetary Ws. is also noted in Australia, S. Africa, and S. America, where the S.E. trades are drawn more westwards during summer on to the E. coasts. They are also drawn over Nigeria from the Gulf of Guinea. In N. America the plateau of Mexico and the arid and high regions of western U.S.A. similarly draw the N.E. trades eastwards. This effect is added to by the opposition of coast lines, particularly if mountainous, to the passage of surface Ws., with the result that round areas of tropical high-pressures in each ocean the Ws. tend to form vast anticyclonic systems, clockwise in the N. and anti-clockwise in the S. hemispheres. In the N. oceans beyond these systems huge cyclonic systems form. It is these systems, which are strongly modified planetary Ws., that form the real W. systems of the world. Towards the equator they are steady and gentle, but towards the pole, until the Arctic regions are reached, they are disturbed by constant eddying, due to mingling of surface and upper currents, the westerlies being characterised by a constant succession of such cyclonic storms. *Local winds.*—Of chief importance are those induced by mountain masses, which change or intensify prevailing Ws. Elevated masses of land, above the clouds and humid atmosphere, respond more readily to the sun's influence, and suffer extremes of temperature day and night, summer and winter. In daytime and during summer they heat the air and cause up-draughts, and *vice versa* at night and during winter; with other complications this helps to form Föhn and Chinook Ws., the bora, northers, etc. Land and sea breezes are caused in warm, calm regions by the different reactions to the sun's rays. Violent storms such as tornadoes and typhoons are largely developed on the margin of the equatorial calms. Ws. of the *upper atmosphere* are very little known; it

seems probable that there is a general drift of cold air, poleward and eastward, above the trades. The force of W. is measured by the anemometer (*q.v.*); it is expressed in lb.-pressure per sq. in. The Beaufort scale, arranged in 1805 by Sir F. Beaufort, was based on the amount of sail a ship could safely carry; in its modern form it may be given:—

		Miles per hr.
0	Calm . . .	3
1	Light air . . .	8
2	Light breeze . . .	13
3	Gentle „ . . .	18
4	Moderate breeze . . .	23
5	Fresh „ . . .	28
6	Strong „ . . .	34
7	Moderate gale . . .	40
8	Fresh „ . . .	48
9	Strong „ . . .	56
10	Whole „ . . .	65
11	Storm . . .	75
12	Hurricane. . .	90

See Buchan, *Report on Atmospheric Circulation*, 1889; Ferrel, *A Popular Treatise on the Winds*, 1893; Bartholomew and Herbertson, *Atlas of Meteorology*, 1899; Pomortzeff, *The Law of the Distribution of the Velocity of Winds*, 1894; and *The Beaufort Scale of Wind Force*, 1906. See also METEOROLOGY.

Windau, now known as Ventpils, a seaport of Courland (Kurzeme), Latvia, at the mouth of the R. Windau, which here forms a small harbour. It has important fisheries and exports timber. Pop. 16,384.

Windermere: (1) The largest lake in England (11 m. by 1 m. broad), on the boundary of Westmorland and Lancashire. Its shores are much indented and wooded, growing steeper towards the N. It drains into Morecambe Bay through the Leven. (2) A tn. of Westmorland, England. Pop. (1931) 5700.

Windflower, see ANEMONE.

Windham, William (1750–1810), Eng. politician. Under Pitt he was, from 1794–1801, Secretary for War with a seat in the Cabinet, and in 1806–07 was in the Grenville administration Secretary of State for War and the Colonies. He was brilliant and loyal, but his changes of opinion earned him the nickname of 'Weathercock W.' He assisted Cobbett in 1802 to found the *Political Register*. His speeches were pub. by Amyott in 1806. A selection from his diary was edited by Mrs. Henry Baring in 1866. *The Windham Papers*, a collection of his correspondence, appeared in 1913, with an introduction by Lord Rosebery.

Windhoek, a settlement, cap. of

S.W. Africa. It has hot thermal springs, and is connected by railway with Swakopmund, on the coast, and with Keetmanshoop (a distance of 380 m.).

Wind Instruments are of three classes: (1) keyboard, *e.g.* organ, concertina, etc., played by bellows; (2) wood-wind, *e.g.* clarinet, flute, oboe, bassoon, and other reed instruments, played by mouthpiece; and (3) brass, *e.g.* horn, trumpet, trombone, and other instruments with cup-shaped mouthpieces.

Windlass, a machine used for lifting weights through a considerable distance, as in raising water from a well. It is a modification of the wheel and axle (*q.v.*), and consists of a cylindrical roller made to rotate upon its axis by a crank and handle. The weight is attached to a long rope which is coiled round the roller as the handle is turned.

Windmills were in use in England as long as 600 years ago, but are believed to have been introduced as long ago as a thousand years. There were two forms of the old-fashioned type, the Ger. and the Dutch. In the former the whole mill was supported on a post round which it could be turned for the sails to catch the wind; in the latter a more substantial fixed body was erected of wood, brick, or stone, only the upper part revolving. Turning was performed by hand in both cases, by means of cog-wheels working on a rack fixed round the support. In the Dutch type, where the movable mass had much less weight, an automatic device was applied, consisting of an auxiliary vane or 'fan-tail.' The wind acts on four or more sails pivoted on an axle with their faces slightly inclined to the plane of the sails, as in the screw propeller or ventilating fan; if these are held facing the wind its force is resolved into a strain and a component vertical to the inclined faces which rotate them on the axle. The rotation of this was transmitted by means of bevelled cog-wheels to a shaft driving the mill wheels. The 'fan-tail,' placed on a long arm on the opposite side of the mill, by virtue of its leverage, kept in the direction of the wind, thus keeping the sails at right angles to that direction. In modern American W. a similar tail serves the same purpose. By supplying a vaned wheel instead of a tail, its rotary motion is transmitted to the mechanism for adjusting the angle of the sails, so that they always face the direction of a varying wind. The sails are inclined backwards from their pivoting, and the plane of revolution is also inclined to clear the

lower part of the tower; they are 20 to 40 ft. in length. When of canvas on a frame, arrangement was usually made for reefing in order to adjust speed to the velocity of the wind. In many cases slats or flaps of thin wood were used and the angle of these could be adjusted. Such W. have become almost obsolete, at any rate not being replaced as they become dilapidated, owing to the introduction of steam engines, and later gas and oil motors. On the other hand, the modern American light and efficient type, an outcome of the genuine improvement in engineering materials, knowledge, and method, has been largely adopted for working water-pumps, to supply farms and houses with their own water. The sails of these are of steel and arranged more numerous and closely to a wheel, as in the ventilating fan; the strips are thin, narrow, and concave towards the wind. The apparatus is provided with a tail, the whole being balanced on a pivot at the top of a light tower of girder steel work. The axle is inclined slightly or horizontal in different patterns. Ball, thrust or roller bearings with arrangements for lubricating are used. An arrangement is provided for starting or stopping the movement from the base of the tower. The motion of the axle may be transmitted direct or through gearing and a separate crank axle to the long piston rod of the pump. The axle is set to one side, while the tail axis passes through the centre; by this means the power of the tail is increased, and in gusty or rough weather the wheel is thrown 'out of the wind,' and the speed thus steadied. There are now many British makes of steel pumping W. which are as good as any in America. Some American W. are rudderless, the wind-wheel being placed on the lee side of the tower. In many, a centrifugal governor is used; others have solid instead of sectional wheels, and are governed by a side vane; but the patterns are very numerous. Power increases at a slightly greater rate than the square of the wind velocity. A 12 ft. mill should furnish 1 h.p. in a 20 m., 1.4 h.p. in a 25 m. wind. A 25 ft. mill should raise one-third of an acre-foot of water to a height of 25 ft. in a working day of eight hours. The economy is reckoned as 1.5 that of a steam-pump, expenditure being less in repairs, and none for fuel and practically none for attendance; there is no supply of water needed. On the other hand, uncertainty of wind demands large storage arrangements. See E. C. Murphy, *The Windmill, its Efficiency and Economic Use*,

Water Supply Papers, U.S. Geol. Survey, 1901; F. Brangwyn and H. Preston, *Windmills*, 1923; M. I. Batten, *English Windmills*, 1930; S. P. B. Mals, *England of the Windmills*, 1930.

Window, an opening in the wall of a building for the admission of light and air, but not for purposes of ingress and egress. As an architectural feature windows play a very small part in the buildings of ancient Egypt, Greece, and Rome. In the Gothic and later styles, however, they are exceedingly important features for every class of buildings. In the Gothic especially they are so characteristic by their general forms and proportions, as well as their decoration and details, as to be in that style equivalent to what the orders are in the temple architecture of antiquity. In architectural design, it is quite contrary to the fundamental principles of the art to leave window and similar openings as mere naked gaps in the wall, and hence they require 'dressings,' or borders, to give an air of finish and completeness. Doors and windows are, therefore, the first features in a building to claim enrichment. One of the great advantages of the Gothic style is that in it the windows derive strong architectural expression from the apertures themselves, the mullions, transoms, and tracery forming an exquisite design and decoration. See ARCHITECTURE.

Windpipe, see TRACHEA.

Windsor: (1) A mun. bor., in full New Windsor, of Berkshire, England, on the Thames. It contains a tn. hall built by Sir Christopher Wren in 1686, the church of St. John the Baptist, with fine examples of Grinling Gibbons's wood-carving and a fine Jubilee statue of Queen Victoria; but it owes its importance to the castle, which is one of the principal royal residences. The tn. was formerly famous for its inns, one of which, the Garter, is frequently mentioned by Shakespeare. Pop. (1931) 20,285. (2) A city and port of entry of Essex co., Ontario, Canada, on the Detroit R., one of the chief manufacturing centres of the state. It has many important industries, of which automobile-building is the chief. It is the centre of an agricultural and fruit-growing dist., and has a large trade on the Great Lakes. Pop. (1926) 38,591. (3) A seaport tn. of Canada, cap. of Hants co., Nova Scotia. It has a considerable export trade in gypsum and limestone. Its chief institution is King's College or Windsor University, founded in 1788. Pop. (1926) 3591.

Windsor Castle, one of the best-known among the royal and palatial

edifices of Europe, is in a manner to England what Versailles is to France and the Escorial to Spain. But while it is infinitely superior to both in point of situation, it far exceeds them, and indeed every other pile of buildings of its class, in antiquity. In its present state, however, this antiquity is little more than nominal. The first structure on the site was that of the Conqueror, but the plan did not begin to assume its present state and arrangement until the fourteenth century, when extensive building operations were carried on under the surveyance of William of Wykeham. Under Elizabeth the terraces were formed and the castle was thus given one of its most striking and attractive characteristics. Under the Stuarts nothing material was done until the Restoration, when the castle began to be modernised in a tasteless and insipid manner. Charles II. added the Star Building. George III., among other alterations, renovated the interior of St. George's Chapel, but the main work of improvement was left to his successor, under whom extensive alterations were carried out under Sir J. Wyatt.

Windt, Harry de, *see* DE WINDT, HARRY.

Windward Islands, a group of the W. Indian Is., comprising the three colonies of Grenada (the seat of gov.), St. Vincent, and St. Lucia, with their dependencies, the Grenadines being divided between Grenada and St. Vincent. Area 524 sq. m. Pop. 175,000.

Wine, the name given to the fermented juice of the grape. The term is also employed to designate alcoholic beverages obtained from the fermentation of the juice expressed from apples, elderberries, rhubarb, etc. The making of W. was well known to the ancients, especially to the Romans. The juice, or 'must,' as it is called, expressed from the grape is a viscous liquid consisting of water holding sugars and various organic and inorganic acids and salts in solution. On exposure to the heat of the sun the 'must' spontaneously ferments. In a few days the fermentation reaches a maximum and the liquid is well stirred and then allowed to stand for about a month. It is then clear and a precipitate has formed at the bottom of the vats. The W. is removed to other vessels and left for a period of several months to complete the after-fermentation. At the end of this time all the sugars in the juice have been converted into alcohol and carbon dioxide. The precipitate from the W. is called argol, and consists chiefly of potassium hydrogen tartrate, containing impurities such as calcium and mag-

nesium tartrates. The precipitate is formed on account of the decreasing solubility of these substances in the liquid as it becomes more alcoholic. During fermentation, red Ws. tend to become lighter in colour and less astringent, due to the separation of tannin and colouring matters. The 'fining' or 'clearing' of Ws. is carried out by the addition of albumin, isinglass, gum, lime, gypsum, etc. The addition of gypsum (plastering) causes the removal of potassium bitartrate, leaving the acid sulphate of potassium which gives a dryness to the W. and increases its durability. Ws. which contain much sugar are often 'sulphurised' by addition of sulphur dioxide, to prevent undue fermentation. The aroma or 'bouquet' of a W. depends on the particular ethers present in the liquid. It has been shown that the bouquet passes with the ferment from one W. to another. Thus, if a ferment is transferred, the W. fermented by such ferment has the bouquet of the W. from which the ferment was taken. The vinous odour is due to the presence of *œnanthic* ether. The amount of alcohol in a W. is determined by the percentage of sugar in the 'must,' one part of alcohol being produced by the fermentation of about two parts of sugar. As a rule the percentage of alcohol does not exceed 12 to 15 per cent., and such Ws. are termed natural Ws. Extraneous sugar is often added ('doctoring') to increase the percentage of alcohol, and such Ws. are then termed fortified Ws. The name 'dry' Ws. is given to Ws. in which the fermentation of the sugars is complete. If fermentation is checked before it is completed, a fruity W. is the result, while sparkling or effervescent Ws. are the result of bottling before fermentation has ceased. The qualities of a good W. are much improved by 'maturing' for several years. The experiments of Pasteur, however, have shown that by heating the W. to about 140° F. for a short time it is preserved from deterioration, and also takes on the properties of matured W. The colours of particular Ws. may be due to the addition of various colouring matters. Red Ws. owe their colour to the fact that the skins of the grape are left in the vats during the first fermentation. Light Ws., such as Burgundy, claret, hock, etc., contain from about 8 to 13 per cent. of alcohol, while champagne contains about 15 per cent. and port and sherry often as much as 24 per cent. For the various types of Ws. *see* CHAMPAGNE WINES, BURGUNDY WINES; HOCK; MADEIRA WINE; MOSELLE; PORT WINE; SACK, SHERRY, etc. *See* A. L. Simon, *History*

of the *Wine Trade in England*, 1906-09, 3 vols.; and *The Supply, Sale, and Care of Wine*, 1923; G. Saintsbury, *Notes on a Cellar Book*, 1920; P. M. Shand, *A Book of French Wines*, 1928, and *A Book of Other Wines*, 1929.

Winfield, a city and co. seat of Cowley co., Kansas, U.S.A., on the Walnut R. It has flour-mills, grain elevators, machine shops, and stock-yards, and there are limestone quarries in the vicinity. Pop. (1930) 9398.

Winfried, the real name of St. Boniface (q.v.).

Wingate, Sir Francis Reginald, Eng. soldier and administrator, b. at Broadfield, Renfrewshire, June 25, 1861. Educated at the Royal Military Academy, and obtained a commission in the Royal Artillery. In 1883 he joined the Egyptian Army. Was military secretary to Sir Evelyn Wood during the Nile Expedition, 1884-85. In 1896 he was made chief intelligence officer to Lord Kitchener. For his services in the Battle of Khartoum and in the Fashoda Expedition he received the thanks of both Houses of Parliament. Was in command of the operations which resulted in the death of the Khalifa near Gedid. His long service as a soldier in Egypt and the Sudan coupled with his knowledge of Arabic and of Arabic customs marked him out as the successor to Lord Kitchener as Sirdar and Governor-General of the Sudan, and these posts he filled from 1899 to 1916. High Commissioner for Egypt, 1917-19. Created bart., 1920. Pub. *Mahdism and the Egyptian Sudan*, 1899; *Ten Years' Captivity in the Mahdi's Camp*, 1912.

Wings, see BIRD, FLYING.

Winifred, St., a virgin saint, probably a native of Wales. She was beheaded by Prince Caradoc for refusing to submit to his attempted seductions. Miraculous cures at Holywell (Flintshire) are attributed to her intercession.

Winkelried, Arnold von, a Swiss patriot, who is said to have decided the victory of his compatriots over the Austrians at Sempach in 1386. The enemy formed a dense mass of steel which the Swiss could not penetrate. Seeing this, W. grasped a number of the Austrian pikes and buried them in his breast, thus creating a gap in the ranks through which the Swiss rushed over his body.

Winkle, see PERIWINKLE.

Winnebago, a tribe of North American Indians related to the Mandan and Tciwere tribes: they inhabit Nebraska and Wisconsin and now number some 2000.

Winnebago, Lake, the largest lake, 30 m. long, in Wisconsin, U.S.A. It

is connected by Fox R. and Green Bay with the Great Lakes, and has an area of 212 sq. m. Its waters are abundantly supplied with fish, and its well-wooded shores, with tns. intervening, make it attractive.

Winnipeg, the cap. of the prov. of Manitoba, Canada, ranks third among the cities of Canada. It is situated at the confluence of the Red and Assiniboine rivs., and is the seat of a university. It is one of the chief banking and financial centres of the Dominion, and is also a great manufacturing centre, being a market for minerals, fur, manufactured goods, and especially for grain. Pop. without suburbs (1931) 217,587. See M. McWilliam, *Manitoba Milestones*, 1928.

Winnipeg, Lake, is in the prov. of Manitoba, Canada. It has a length of 250 m., and is from 5 to 70 m. broad.

Winnipegosis, Lake, a shallow lake in north-western Manitoba, extending into Saskatchewan. It has a length of 127 m., and receives the Red Deer and Swan rivs., while it discharges into Lake Manitoba to the S.E. through the Water Hen R.

Winona, a city and co. seat of Winona co., Minnesota, U.S.A., on the Mississippi R. The chief manufacturing establishments are flour and lumber mills, wagon and carriage factories, agricultural implement works and railroad shops. Pop. (1930) 20,850.

Winslow, Edward (1595-1655), one of the 'pilgrims' who sailed for America in the *Mayflower*. He came of an old Eng. family. W. took an active part in the life and organisation of the Plymouth colony in New England and returned to England on one or two occasions as agent for the settlers. He was made governor of the colony in 1624 and was several times re-elected.

Winsor, Justin (1831-97), an American historian, b. at Boston. After studying at Harvard and Heidelberg, he was appointed librarian at Boston in 1868, holding this post until 1877, when he removed to Harvard. He edited the *Memorial History of Boston* (4 vols.), 1880-81, and *The Narrative and Critical History of America* (8 vols.), 1884-90, and wrote: *Christopher Columbus*, 1891; *The Mississippi Basin*, 1895; *The Westward Movement*, 1897.

Winston-Salem, a city, co. seat of Forsyth co., N. Carolina, U.S.A. It is the commercial centre of a fertile agricultural region, especially noted for its tobacco; indeed, the growth of W. is chiefly due to this industry, and the manuf. of cigarettes and flat plug tobacco here is most important. Pop. (1930) 75,274.

Wint, Peter de (1784-1849), an Eng. landscape painter of Dutch origin and a 'little master' of the old Eng. school. He studied at the Royal Academy. De W. is best known for his water-colours, which have all the purity and freshness of the best work of this school.

Winter commences, astronomically, when the sun has attained his lowest declination, i.e., his lowest noon position in the sky. This occurs for the N. hemisphere when the sun enters Capricorn, for the S. when he enters Cancer, that is, when he is in the zenith on those tropics. The sun's rays falling then at the least angle with the horizon, temperature falls, to rise again towards spring when the sun passes his mean noon position. Climatically W. is very varied, corresponding with a dry season usually, but in 'Mediterranean' regions with a wet season. Biologically it is the annual period of suspended animation for many forms of life.

Winter's Bark, the bark of *Drimys winteri*, an evergreen tree (order Magnoliaceæ). W. B. resembles cinnamon, and is used as a tonic and in cases of scurvy.

Winterthur, a tn. of Switzerland in the canton of Zürich, with manufs. of cotton goods, including cambric and machinery. A good wine is produced in the neighbourhood. Pop. about 50,000.

Winthrop Family: *John* (1588-1649), governor of the colony of Massachusetts (1629-34 and 1637-49), b. in Suffolk, England. He sailed from Yarmouth with 900 persons in 1630, and on the voyage composed an essay, *A Model of Christian Charity*. During his life he had more influence probably than any in forming the political institutions of the northern states of America. *John* (1606-76), governor of Connecticut, son of the preceding. In 1635 went to Connecticut, built a fort at the mouth of the Connecticut R., was made governor of the colony, and founded the city of New London in 1661. He obtained a charter for the colony from Charles II., and was first appointed governor under it; and, in 1676, represented his colony in the congress of the united colonies at Boston. *John, LL.D.* (1715-79), an American scholar, b. in Massachusetts; in 1738 was appointed Hollis professor of mathematics and natural philosophy at Harvard. He pub. tracts on earthquakes, comets, and other astronomical subjects. *Robert Charles, LL.D.* (1809-94), an American statesman and orator, b. at Boston; graduated at Harvard College in 1828, studied law with Daniel Webster, was admitted to the

Bar in 1831, and was elected to the state legislature in 1834, where he served five years, three as Speaker of the House. In 1840 he was elected to Congress, of which he was a member for ten years. His *Addresses and Speeches* were pub. in 1852.

Wire-drawing. Rods from which steel wire is to be drawn are generally rolled to about No. 8 gauge, say 0.16 in., the further reductions being performed through dies by means of cold drawing. The rods after leaving the rolling mills are first lightly pickled to remove the scale and washed; after being dried the rod is mechanically drawn through dies by being wound on to drums. Modern wire-drawing employs a series of dies, the number being fixed by the amount of reduction the wire will stand before requiring annealing. But it is not possible, without overstraining the finished wire, to pull from the end through all the dies at once, consequently an arrangement of power-driven drums must be supplied between each set of dies, round which the wire is lapped two or three times. Again, each succeeding drum must revolve at a higher speed than the preceding one, in order to take up the elongation in the wire. Owing to the hardening effect of continuous cold drawing on steel wire, the amount of reduction is strictly limited, because of the wear on the dies, consequently the process is much more successful when the wire is made of copper or brass. In order to reduce the wire to very small gauges, it must be annealed after so many passes—usually two to six, varying with the amount of reduction—so as to re-soften the material. The dies used for ordinary gauges are made of hard white cast iron, and for smaller gauges of a very high carbon self-hardening steel. The finest sizes are drawn through gems—either diamonds or rubies. Piano-wire of 0.0254 in. diameter may have a tensile strength of over 200 tons per sq. in. The carbon content may vary from dead mild, say, less than 0.1 per cent. in telegraph wire, up to 0.9 per cent. for the best hard wire.

Wireless. Articles on BROADCASTING, LOUD-SPEAKER, MICROPHONE, THERMIONIC VALVE, etc., are to be found in earlier volumes, and this article deals with the general features of W. transmission and reception. What happens in the transmitting station? What happens at the receiving station? and What happens in between? are the three questions asked by the W. Everyman. Since the A B C of W. depends to some extent on the X Y Z of mathematical physics it is not possible to answer all these questions in detail,

but the veriest layman can obtain a fairly general idea of the agencies at work without any knowledge of mathematics. The processes occurring at the transmitting and receiving stations are dictated by what can happen in between; it is therefore best to begin by answering the last question.

What Happens In Between?—Two well-known analogies will help us to appreciate the answer to this question. If a stick is dipped into a pool of water and moved up and down, ripples or waves spread out from the source of disturbance. A new wave sets out for each complete oscillation of the stick; so that the distance between consecutive waves is determined by two factors: (i.) the speed with which the waves travel along the water, (ii.) the speed of oscillation of the stick; in other words, the *wave-length* depends on the *frequency* of vibration of the source of disturbance and on the *velocity* of the waves in the transmitting medium water. If we call the velocity V , the wave-length λ , and the frequency of vibration n , then $V = n\lambda$ is the relation between the three quantities. So much for the source of the waves. Now suppose a cork is placed on the water at some distance from the source. The cork will bob up and down when the disturbance reaches it and from the point of view of the cork three factors determine its sensations, viz. the size of the waves, their wave-lengths, and the velocity with which they travel towards it. We can readily appreciate these statements because we receive visual evidence of the processes at work, and visual evidence always appeals to our imagination. A somewhat analogous state of affairs occurs when communication is established between two people by means of sound waves (see SOUND). In this case the vocal cords of the speaker create the disturbance at the transmitting station, the disturbance travels through the intervening medium, the air, while the ear drum of the listener is the receiving station. In this case also, the wave-length of the waves is determined by the frequency of vibration of the vocal cords and by the velocity of sound in air; so that again we have $V = n\lambda$ as the relation between these three quantities. The listener's sensations are governed by the way in which his ear is struck by the sound waves, and this is determined by the size of the waves that strike his ear, their wave-lengths, and the velocity with which they travel towards him. It is more difficult to appreciate the mechanism by which communication is established

in this case because the appeal is now made, not to the sense of sight, but to the sense of hearing. At a W. station the source of disturbance is an electric current surging to and fro with enormous rapidity up the aerial wire and back again to earth. For example, an aerial broadcasting W. waves 300 metres long is traversed by electric currents oscillating to and fro 1,000,000 times per second. Following the theoretical work of Clerk Maxwell, Hertz demonstrated the possibility of transmitting electromagnetic waves through space. The necessary condition for transmission to any considerable distance is that the currents in the aerial must be *high-frequency* currents. The medium through which these waves travel is the ether (*q.v.*), and their wave-length is determined by two factors, the frequency of the aerial currents and the velocity with which the waves travel through the ether—a velocity of 186,000 m. per sec. This velocity is, in point of fact, the velocity with which light waves travel through the ether; indeed the only difference between light waves and W. waves is a difference of wave-length. Electromagnetic waves that affect our sense of sight are only of the order of 10^{-6} cm., whereas W. waves have wave-lengths of the order of hundreds of metres. Further, the relation $V = n\lambda$ holds good for W. waves; for example, the velocity of these waves is 3×10^{10} cm. per sec., so that if $\lambda = 3 \times 10^4$ cm. $n = 1,000,000$, as was stated earlier in the article. W. waves travel between the surface of the earth and an atmospheric layer of ionised gas, known as the *Heaviside layer*, which reflects the waves and keeps them within the limits indicated so that they follow the curvature of the earth. Indeed in short-wave transmission, long-distance reception is due entirely to the waves that have been reflected by the Heaviside layer. The height of this layer varies with the time of day, since it is affected by sunlight, a fact which accounts for the varying conditions of reception throughout the day.

What Happens at the Transmitting Station?—The problems presented to the W. engineer are as follows. The person broadcasting emits low-frequency waves, for example middle C of the piano vibrates 256 times per sec., while the currents delivered to the aerial must be high-frequency currents. Furthermore, in order that the signals received by distant receiving sets shall be fairly powerful, the aerial currents must be very strong. The engineer therefore arranges a circuit connected to the aerial in which high-frequency cur-

rents are generated of the right order of frequency. The person broadcasting speaks into a microphone (*q.v.*) which is connected to a battery. The sound waves impinging on the microphone cause the steady battery current to fluctuate in sympathy with them, so that the fluctuating microphone currents are electrical copies of the sound waves. These feeble currents are then amplified considerably by means of a series of thermionic valves in a manner to be described shortly, and the amplified currents are then passed on to the valves generating high-frequency currents. After a further stage of amplification the currents are delivered to the transmitting aerial. Before the person begins to speak into the microphone, the waves emitted by the aerial are like those represented in Fig. 1, all of the



FIG. 1

same size. The effect of the fluctuating microphone currents caused by the speaker's voice is shown in Fig. 2, which represents low-frequency waves carried on the back of the high-frequency waves (for convenience of representation it is necessary to magnify the wave-length of the high-frequency waves). The high-frequency waves are called *carrier waves*; the effect of the low-frequency microphone currents is to modulate the size of these high-frequency waves as Fig. 2 shows.

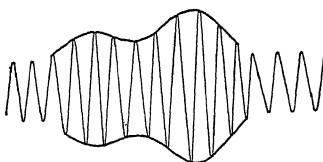


FIG. 2

The modulation depends entirely on the sounds emitted by the speaker; the louder he speaks the greater the extent of the modulation; the higher the pitch of his voice the more rapid the variations in the modulations produced. The outline of the modulated waves is an electromagnetic copy of the sound waves emitted by the speaker. The more faithful the copy the more faithful the reproduction. Distortion at the transmitting station is the result of bad copying of the sound waves;

the broadcasting engineer's copy-book still leaves room for improvement. He has a very difficult task to perform from the microphone to the aerial, but the results of recent research have enabled him to stamp a fairly accurate copy of the sound waves on the carrier waves.

What Happens at the Receiving Station?—Faraday discovered in 1831 that if an electrical conductor is placed in a varying electromagnetic field an electromotive force is induced in the conductor. In W. reception the conductor is the aerial wire and circuit, so that minute high-frequency currents are set up in this circuit by the incoming W. waves. These currents will be appreciable only if the aerial circuit is electrically similar to the aerial circuit at the transmitting circuit, for then we get resonance (*q.v.*); that is to say, the natural period of the receiving aerial is the same as that of the incoming waves. In this case, just as a swing will oscillate violently when the pushes are timed to be in tune with the natural period of the swing, so the aerial currents are greatest when the circuit is in tune with the incoming signals, i.e. when it is in tune with the transmitting aerial. Fortunately it is not necessary to construct an aerial having dimensions that are identical with those of the transmitting aerial; the natural period of an aerial circuit can be varied by altering the capacity of the condenser in the circuit until it is in tune with the desired station. When this is achieved the high-frequency currents induced in the aerial by the W. waves from that particular station will be exceedingly greater than those from any other station. At the same time these currents are generally too minute for practical reception, so that it is necessary to amplify them. This is done by means of a valve or valves in a manner to be explained later. The amplified high-frequency alternating currents are now passed on to a 'detector' valve which rectifies the alternating currents. Rectification is necessary because it is quite impossible for the diaphragm of a loud-speaker or earphone to vibrate at something like 1,000,000 times per sec.; its inertia is too great and if such currents are passed through a loud-speaker the diaphragm will take up the mean position, i.e. it will not move. The detector valve, then, allows only one-half of each alternation to pass through it. Hence of the modulated carrier wave sent out from the transmitting station and amplified at the receiving station only one-half, say the top half of Fig. 2, gets through the detector

valve. The output of the detector valve therefore consists of a series of modulated direct-current pulses. These are generally amplified still further by one or more valves; they are then passed through a loud-speaker and the diaphragm will vibrate in time with the modulations; the diaphragm will not respond to each direct-current pulse of the rectified carrier wave, since these follow each other too rapidly. It is, however, displaced from its equilibrium position and the extent of its displacement varies in sympathy with the modulations. Hence the diaphragm of the loud-speaker vibrates exactly as the diaphragm of the microphone at the transmitting station, while the sound waves created by the diaphragm of the loud-speaker are similar to those emanating from the person who is broadcasting.

The Three Functions of a Valve.—The general arrangement of the components of a W. valve together with a description of its dependence on thermionic emission has been described in the article on THERMIONICS. A valve is used for three purposes in W. telephony: (i.) for amplifying alternating currents, (ii.) for rectifying alternating currents, (iii.) for generating high-frequency alternating currents. We shall describe its mode of action in each case.

(i.) *The Valve as an Amplifier.*—Fig. 3 is a purely diagrammatic

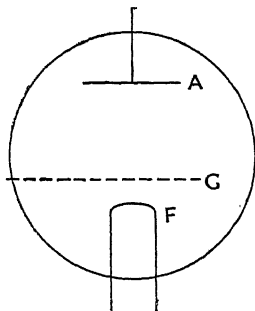


FIG. 3

representation of a W. valve. The heated filament *F* is actually surrounded by a coarse mesh of wire called the grid *G*, while a plate *A*, called the anode, surrounds the grid. The heated filament emits electrons which are attracted to the anode, because the latter is positively charged by connecting it to a high-tension battery. The flow of elect-

rons towards the positively charged anode constitutes the current that flows round the anode circuit. Since the grid is much closer to the filament than the anode is, it follows that if a very small positive charge is given to the grid the electrons will be encouraged to leave the filament and shoot through the grid to the anode, whereas quite an appreciable positive charge on the anode would be required to give the same encouragement. Again, if a small negative charge is placed on the grid the electrons leaving the filament will be repelled and will not reach the anode. Thus a very small difference of potential between the grid and the filament will control the electron current towards the anode, whereas if the grid were not present a much larger difference of potential between the anode and filament would be required to obtain the same effects. Herein lies the secret of the valve as a current amplifier. The minute high-frequency alternating currents induced in the aerial pass into the grid and cause corresponding changes of potential between the grid and the filament. Each change is accompanied by a change in the electron flow towards the anode with the result that the fluctuations in the anode current are considerably greater than those of the aerial currents flowing into the grid.

(ii.) *The Valve as a Rectifier.*—

We have seen that the flow of electrons inside a valve takes place from the heated filament towards the grid and anode. Since the electrons are negative particles of electricity, this flow is equivalent to a current flowing towards the filament. Suppose, then, an alternating-current supply is connected across the grid and filament. When the current is flowing into the grid, the electron stream will carry it through to the filament; when, however, the current is flowing into the filament, its passage through the valve is barred because there is only a one-way traffic for the electrons, namely from the filament to the grid. Hence one half of the alternating current is suppressed and a series of direct-current pulses flowing from the grid to the filament inside the valve is the result. Since the grid controls the anode current, the direct-current pulses in the grid circuit give rise to corresponding direct-current pulses in the anode circuit, and the anode current is either led into the earphones of the receiver or amplified still further before actuating a loud-speaker.

(iii.) *The Valve as a Generator of High-frequency Alternating Currents.*—

A very simple case will serve to show how a valve is used in order to generate continuous high-frequency alternating currents. Fig. 4 shows a typical

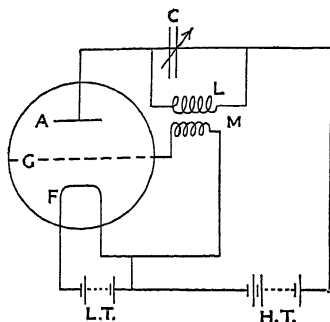


FIG. 4

circuit. The oscillating circuit is included in the anode circuit; it consists of a coil L , or inductance, in series with a variable condenser. Under suitable conditions the charge on one plate of the condenser in this circuit will rush through the coil to the other plate of the condenser, 'overreach' itself and rush back, and so on, just like a swing rushing to and from one extreme to another. But just as it is necessary to supply some energy to start the swing and to keep it going, so it is necessary to supply some energy to start the oscillations in this circuit and to keep them going. Suppose the grid circuit is suddenly closed; then the current flowing through the coil L induces a current in the coil M in the grid circuit. This charges the grid and momentarily throttles the flow of electrons to the anode. Thus there is a sudden jerk in the current flowing round the oscillatory circuit which is sufficient to start the oscillations. If the coils L and M are 'coupled' correctly, then the oscillations are kept going somewhat as follows. The oscillating currents rushing through L induce oscillating currents in M . These in turn charge the grid and throttle the flow of electrons to the anode. Hence each surge of current through the coil L results in a fresh jerk in the current supplied from the H.T. battery to the oscillatory circuit, and if these jerks are timed correctly the oscillations are kept going. The 'timing' is important; a swing is kept going by timing the pushes or

jerks so that they occur at the end of one oscillation of the swing. The 'timing' of the jerks in the oscillatory circuit is arranged, as stated, by adjusting the coupling between the two coils L and M . In a simple transmitting set, the coil L is included in the aerial circuit and the high-frequency currents thus traverse the aerial.

Direction Finding by Wireless.—A frame aerial (*q.v.*) has directional properties; if the plane of this aerial is at right angles to the lines of magnetic force arriving at the aerial, the currents induced in the aerial are greatest and there is consequently a maximum of sound in the receiving set. If the aerial is now turned through 90° , the lines of magnetic force no longer thread the aerial and no sound will be heard in the receiver. The application of this directional property of a frame aerial to enable a ship to obtain its bearings is quite simple. In one method the ship sends out a signal and the direction of the ship from each of two stations on land is determined. This enables the stations to locate the ship and the information is then transmitted to her. Conversely, stations such as lighthouses may transmit distinctive signals to enable the ship to locate her own position. In this case the ship determines the direction of one lighthouse by turning the frame aerial until the sound received is a minimum; a compass mounted immediately below the axis of the aerial then enables the observer to determine the direction of the first lighthouse. He then repeats the process for the second lighthouse, when, by means of his chart, he can determine the position of the ship.

The Growth of Wireless.—W. had its origin in a set of differential equations in which Clerk Maxwell (*q.v.*) discovered that electromagnetic waves could be propagated through the ether just like waves of light—in fact, light waves themselves are extremely short electromagnetic waves. His theories were pub. in 1873 and in 1888 Hertz (*q.v.*) gave a laboratory demonstration of the production and detection of W. waves. The source of Hertz's electromagnetic waves was a Leyden jar connected to a spark-gap through a coil of wire, while his detector was merely a circular piece of wire terminating in brass knobs close together. Hertz found that small sparks passed between these knobs when a discharge of the Leyden jar took place across the spark-gap of the transmitter. Contemporary workers with Hertz were Sir Oliver Lodge (*q.v.*) and Brauly,

who invented a new form of detector called a *coherer*. This was a tube containing loosely packed metal filings connected in series with a battery and a galvanometer. The metal filings normally have a high resistance, but when an electromagnetic wave falls on it, the resistance becomes much smaller and the battery then sends through the coherer a larger current that may be detected by the galvanometer. Marconi invented an improved magnetic detector which was followed by the well-known crystal detectors. Following O. W. Richardson's discovery of thermionic currents (*q.v.*), Fleming in 1904 invented the first W. valve, which consisted of a heated filament and an anode. This two-electrode valve gradually increased in popularity as a detector until Lee de Forest in 1907 introduced the third electrode known as the grid and thus created the three-electrode valve. Its properties were not fully appreciated at the time, but it ultimately led to the rapid development of W., and in the hands of an increasing number of W. engineers it created the modern technique of the subject. The next important development likely to take place is the popularisation of television (*q.v.*), which is now becoming amenable to practical broadcasting. See Greenwood, *Wireless Telegraphy and Telephony*; Turner, *Outlines of Wireless*; Marchant, *Radio-Telegraphy and Telephony*; Robinson, *Everyman's Wireless*; Bacon, *A Simple Guide to Wireless*; Sir Oliver Lodge, *Talks about Wireless*; see also *B.B.C. Year Book*; *The Wireless World*.

Wiring, Electric, see ELECTRIC LIGHTING AND WIRING OF HOUSES.

Wirksworth, a market tn., Derbyshire, England, 14 m. N.N.W. of Derby; has lead mines, stone quarries, and manufs. of tape, hosiery, silk, and hats. St. Mary's Church dates from the thirteenth century. Pop. (1931) 3910.

Wirth, Karl Joseph, Ger. statesman; b. Sept. 6, 1879, at Freiburg in Breisgau; son of Karl W., engineer. Graduated Freiburg, 1905. Professor at Freiburg Realgymnasium, 1908. Member: Baden Diet, 1913; Reichstag, 1914. Minister of Finance, Baden, 1918. Member National Assembly, 1919. Ger. Minister of Finance, 1920; Chancellor, May 1921 to Nov. 1922; resigned because unable to pass measures to stabilise mark. Left Centre Party, 1925; rejoined on assurance of its loyalty to republic, 1926. Appointed Minister for Occupied Territories, 1929. Minister of Interior, 1930.

Wisbech, a mun. bor., market

tn., and river port, Cambridgeshire, England, on the R. Nen, in the centre of an agricultural and fruit-growing dist.; has manufs. of agricultural implements, beer, and oil-cake. Pop. 11,000.

Wisby (Visby), a seaport of Sweden, cap. of Gotland län, on the W. coast of Wisby Is. in the Baltic. St. Mary's Cathedral was founded about 1190-1225, and is still used. St. Nicholas is nearly as old, but in ruins. W. was an important member of the Hanseatic League, and gave its name to a maritime legal code (*see SEA LAWS*) of the thirteenth century. Its ruined turreted walls date from the thirteenth century. It is a bishop's seat and a favourite resort. Sugar, chalk, and cement are among its exports. Pop. (1929) 10,377.

Wisconsin: (1) (Often called the **Badger State**.) One of the N.-central states of the U.S.A., and is twenty-fifth in size of the republic. Admitted to the Union 1848. It is bounded on the N. by Michigan and Lake Superior, E. by Lake Michigan, S. by Illinois, Iowa and Minnesota, W. by Minnesota and Iowa. The greatest length is 300 m., the greatest width 250 m., and the total area about 56,066 sq. m. It is watered by numerous rivs., notably the Mississippi, St. Croix, Menomonee, Montreal, St. Louis, and the Wisconsin. The principal sheet of water is Lake Winnebago (*q.v.*), and around the Kettle Moraine are clustered hundreds of small lakes. The surface is generally high plain with high bluffs along the rivs. and lakes. The forest growth is dense, particularly in the northern part, which has a severe climate. In the S. is prairie-land. Iron and copper ore are found in the N.W., while lead occurs in the S.W. The climate generally is temperate, but is subject to extremes and in winter is very severe. The air is dry. Agriculture is the greatest industry, and the chief crops are Indian corn, hay, and wheat. Tobacco of excellent quality is grown successfully, and beet-sugar factories flourish. Cabbage and canning peas are grown in great quantities. For dairy products and honey W. was the first state in 1930. The combined value of dairy products—butter, cheese and condensed milk—averages over 200 million dollars for a year. There are over 1,800,000 milch cows in the state. Enormous quantities of milk are shipped to Chicago. Grapes, apples, strawberries, and cranberries are the most important fruit crops, cucumbers are grown for pickling, and string beans for canning. The fisheries are important. Besides dairy products.

there are important manufs. of motor vehicles, lumber and timber, foundry and machine-shop products, paints and varnishes, meat-packing, knitted goods, furniture, boots and shoes, rubber tyres, electrical machinery and supplies, and leather. Milwaukee is a large port and a great manufacturing centre, with hosiery and textile mills, tanneries, soap and candy factories, etc. The system of education is especially good, and the state university has attained quite a reputation. In 1921 an education law was passed compelling all children between seven and fourteen years and all those not regularly employed between fourteen and sixteen to attend school for a fixed period every year. Transportation is good and several railways feed the state. Early settlement was hindered by continual wars with Indians, and the first white man to enter the state was Jean Nicolet, who came there in 1634. During the Civil War, W. supplied some of the best regiments in the Northern army. The growth of the pop. is steady, and in 1930 it was 2,939,006. Madison is the cap., pop. 57,899; other important cities: Milwaukee, 578,249; Racine, 67,542; Kenosha, 50,262; Oshkosh, 40,108; Green Bay, 37,415. (2) The chief riv. of the interior of Wisconsin, U.S.A., rising in Lake Desert on the Michigan boundary, and flowing S. and S.W. past Portage City to join the Mississippi near Prairie du Chien. A canal connects it with Fox R. and Lake Michigan. Length about 600 m., navigable to Portage. There are rapids and falls in parts.

Wisconsin, University of, was established in 1848 at Madison, the cap. of the state. It is a co-educational institution and is financed by the state. Although the academic and other usual courses are taught there, the university specialises in scientific farming and dairying, these being two of the main interests of Wisconsin. It has about 11,000 students and 630 teachers. Many of the pupils take the extension or the summer courses.

Wisdom, Book of, see ECCLESIASTICUS; PROVERBS, BOOK OF; SOLOMON, THE WISDOM OF.

Wiseman, Nicholas Patrick Stephen (1802-65), Eng. cardinal of the Rom. Catholic Church; b. at Seville. His father was descended from an anct. Eng. family, but had settled as a merchant in Waterford. W. was educated for the priesthood, and became professor of Oriental languages and then rector of the Eng. college at Rome. After being made a bishop, he was nominated Archbishop of Westminster by the pope in 1850

and also made a cardinal. A sudden anti-Roman agitation led to an Act penalising the assumption of ecclesiastical titles in respect to places in England, which, however, was practically a dead letter from the first. W. was very learned: his works include *Lectures on the Connection between Science and Revealed Religion*; *Horæ Syriacæ*; *Lectures on Doctrine and Practice of Roman Catholic Church*. W. was one of the founders of the *Dublin Review* and contributed to it. Consult W. Ward, *Life and Times of Cardinal Wiseman* (5th ed. 1900).

Wishart, George (c. 1513-46), a Scottish Protestant martyr and reformer. He was early accused of heresy in Scotland, and then travelled on the Continent. He returned to Scotland (1543), preaching Lutheran doctrines and found ardent supporters. Through the enmity of Cardinal Beaton, W. was arrested at Ormiston (1545) and burnt at St. Andrews on a charge of heresy (1546). W.'s translation of *The Confession of Faith of the Churches of Switzerland* was printed in the *Wodrow Miscellany*, i. (1846). See Laing's ed. of Knox's Works, i. and vi.; Foxe, *Book of Martyrs*; Fleming, *Martyrs of St. Andrews*; Rogers, *Life*, 1876; Cramond, *Truth about George Wishart*, 1898; Maxwell, *Old Dundee*, 1891.

Wishaw, a burgh of Lanarkshire, Scotland, 5 m. from Carlisle. Now amalgamated with Motherwell. There are vast coal-mines, blast furnaces, iron and steel engineering, and railway wagon works. Pop. with Motherwell (1931) 64,708.

Wismar, a seaport of Mecklenburg-Schwerin, Germany, at the head of Wismar Bay on the Baltic, 18 m. from Schwerin. Its Alte Schule dates from about 1300, and there is a fifteenth-century guard-house. W. was a member of the Hanseatic League. It has iron foundries, breweries, and important fisheries. W. belonged to Sweden (1648-1803). Pop. (1925) 26,016. See Willgeroth, *Gesch. der Stadt Wismar*, part i., 1898.

Wissembourg, see WEISSENBURG.

Witch, see MAGIC, DEMONOLOGY, INCANTATION, DIVINATION.

Witchcraft includes, broadly, any claim to a power to produce effects by supernatural means. This pseudopower may be called also sorcery, conjuration, incantation, divination, or magic; but the legal consequences that flowed from the attempt to practise the art were, generally speaking, the same. For centuries, and, indeed, until comparatively modern times, people believed in the possibility of W., and psychologists have endeavoured to account for this

universal belief. Perhaps the long-held belief in spirits as entities whose existence rested on literal Scriptural authority coupled with the innate superstition of mankind may explain the belief. Even down to the seventeenth century and later some of the most eminent scholars clung to the superstition, e.g. Matthew Hale, the great jurist, who was of Puritan stock. It has been said, not unjustly, that W., or sorcery, 'was a convenient crime to fix upon those who had no other.' In England there were laws concerning W. as early as the Conquest, and thereafter the ecclesiastical and secular courts had concurrent jurisdiction in cases of W. The ecclesiastical courts punished by penance and fine up to 1542; at common law W. was indictable, but not a felony, because no violence was offered, though it was made a felony by a statute of 1542. (The usual term for W. in indictments drawn in Latin was *incantatio*.) The earliest trial reported in England was before a secular court in the year 1324, while, in the same year, occurred the famous trial before the Bishop of Ossory of Dame Kyteler (consult the report of Thomas Wright in the publications of the Camden Society). Apart from the statutes passed in 1542 and 1562, the Act of 1601, defining and prescribing the punishment for W., remained for over a century the principal Act concerning W. until replaced by the Act of 1736. Under all the Acts the prosecution had, except in the case of love philtres, to prove that injury had been done to person or property or intended to be done or, alternatively, that gain was made. Trials for W. were most numerous in the seventeenth century, but were never so numerous nor attended with such revolting details as in Scotland and in Continental countries. This latter fact is explained by the waning authority of the ecclesiastical courts and partly by the fact that the method of extracting 'confession' by torture was not employed in English cases of W. except informally by such rascals as Hopkins the witch-finder and his fraternity. The most instructive case reported in the *State Trials* is that of the Suffolk witches at Bury St. Edmunds in 1664-65 (consult *State Trials*, vol. vi., page 647). Hale was the presiding judge and Sir Thomas Browne the chief expert witness, and, from what has been said *supra*, it is not surprising to find that Hale, in his summing up, did not doubt but that 'there were such creatures as witches, for the Scriptures affirmed it, and the wisdom of nations had provided

laws against the curious in witch-lore.' But about the end of the seventeenth century public opinion concerning W. began to change and the conviction in 1702 of Hathaway for pretending to be bewitched and for assaulting a witch hastened the decline of the belief. The last recorded conviction in England was that of Jane Wenham in 1712, but in Scotland a woman was actually burned alive in Sutherland as late as 1722. For Continental trials consult Scheltens, *Geschiednis der Hexenprocessen*, Haarlem, 1828; and for Scottish, Pitcairn, *Criminal Trials*. As the law now stands any person pretending to use W., tell fortunes, etc., may, under the Act of 1736, be imprisoned for a year, but the statutory provision for punishment by the pillory has been abrogated. Proceedings may also be taken under the Vagrants Act, 1824 (see VAGRANTS).

There was a copious literature on W. and allied topics in the sixteenth and seventeenth centuries. Among the most famous writers were Erastus, Bodinus, Polydorus, and Hieronymus. The practice of W. was fully described in Reginald Scott's *Discovery of Witchcraft*, pub. 1584, the title-page whereof runs: 'The discoverie of Witchcraft, wherein the lewde dealing of witches and witchmongers is notablie detected. . . whereunto is added a treatise upon the nature and substance of spirits and devils.' The work, which is full of classical learning, is dedicated to Sir Roger Manwood, Lord Chief Baron of the Court of Exchequer, who no doubt believed in W. as implicitly as did Hale. Scott makes much of the fact that Erastus himself, while aware that the promises of magicians and enchanters were false and 'nothing else but knaverie and old wives' fables,' yet believed in the fact of witches 'fleeing in the aire, their transferring of corne or grasse from one field to another.' Scott's work deals, among other things, with the 'subtiltie of astrologers,' 'charms for ague' and auguries, and is embellished with numerous citations from old writers. Other old works on W. include Boguet, *De Sorceris*, 1610; Guacius, *Compendium de Maleficorum*, 1626; Ponzinibius, *De Lamiis*, 1592; Wierus, *De Lamiis*, 1577-79; works by Cicogna, 1605, and Glanvil, 1688, and, of a later day, Potts on *Witchcraft in Lancashire*, 1845, and Kyteler on *Sorcery Prosecution in 1324*, 1843. To these may be added the remarkably voluminous work (like many of the above in Latin) entitled *Thesaurus Exorcismorum atque conjurationum*.

terribilium, etc. pub. in 1608. This work summarises the treatises of F. Valerius Polydorus, F. Hieronymus, Peter Antonius, and others. See W. E. H. Lecky, *History of Rationalism in Europe*, 1865; J. W. Wickwar, *Witchcraft and the Black Art*, 1925; M. Summers, *History of Witchcraft and Demonology*, 1926, and *Geography of Witchcraft*, 1927; G. L. Kittredge, *Witchcraft in Old and New England*, 1929.

Witenagemot (Saxon *witan*, to know, and *gemoth*, assembly), in Anglo-Saxon times the great national Council or parliament, consisting of members of the royal family, the archbishops, bishops, abbots, ealdormen, and king's thanes. In practice its members varied from a score to a hundred; but in theory, the W. having been evolved by absorption of the lesser Ws. or folkmoths of the tribes comprising the Heptarchy, it is probable that all freemen were entitled to attend. The meetings were generally held biennially and at different places. The *de jure* powers of the W. were unlimited, and it could elect the king or dethrone him for misgovernment, declare war or make treaties of peace, levy taxes, appoint and remove all the great officers of state, control most ecclesiastical matters, and deal as a Court of Final Appeal with all redoubtable offenders. After the Conquest the W. became the Great Council or *Commune Concilium Regni*, but its judicial powers, though still as great as before in theory, began to devolve for the most part on a committee called the *Curia Regis*, the evolution of which body will be found described under CABINET.

Witham: (1) A tn. of Essex, England, on Brain R. There are anct. earthworks round the church of St. Nicholas. Pop. (1931) 4370. (2) A riv. rising in Rutland, England. It flows past Grantham and Lincoln, and then S.E. past Tattershall and Boston into the Wash above Welland R.

Witness, see EVIDENCE, OATH.

Witney, a market tn. of Oxfordshire, England, on the Windrush, 10 m. from Oxford. It is famous for blanket making, in which connection it may be noted that according to a legal decision the term 'Witney blanket' cannot be applied to any blanket except those made in W. It also manufs. gloves and other woollen goods. Among its fine public buildings are a thirteenth-century cruciform church (restored 1867), the grammar school (1683), and Blue Coat School (1723). Pop. (1931) 3410. See *History of Witney* by Giles (1852), Monk (1894).

Witt, De, see DE WITT, JAN.

Wittenberg, a tn. of Saxony, Germany, on the Elbe, about 59 m. from Berlin. The famous university (founded 1502) was incorporated with that of Halle (1817). The Court of the Augusteum (theological seminary) contains Luther's house, and that of Melancthon is near by. Luther preached in the Stadtkirche, and to the doors of the Schlosskirche (restored 1892) affixed his ninety-five theses against indulgences and other doctrines. W. possesses numerous paintings by Cranach. There are brick yards, iron foundries, breweries, dye works, manufs. of spirits, oils, woollen cloth, linen, leather, and hosiery, and fishing industries. Pop. 25,536.

Wittingau, now known as Trebon, a tn. of Bohemia, Czechoslovakia, 14 m. from Budweis. It has an old castle, and near by are the Luznice lakes. It is a fishing centre. Pop. 5500.

Witu, or **Vitu**, a sultanate of Taland prov., British E. Africa Protectorate (since 1890), extending along the Indian Ocean. The cap., Witu, is 16 m. from Kipini, and its port, Mkonumbi, has a fine harbour in Manda Bay. Omar became sultan in 1895, and is guided by a British resident. Pop. (mainly Swahilis) about 15,000.

Witwatersrand, see JOHANNESBURG.

Wood, or *Isatis tinctoria*, a cruciferous plant, with yellow flowers and pendulous pods. It was formerly cultivated extensively for the blue dye which it yields by fermentation of the leaves, and is still grown to a small extent. The dye was used by the ancient Britons.

Woburn: (1) A market tn. of Bedfordshire, England. It contains Woburn Abbey, the seat of the earls and dukes of Bedford (since 1547), on the site of a Cistercian abbey (1145), the present building dating from 1744. The abbey stands in Woburn Park, and has a valuable art collection. Straw-plaiting was formerly carried on. Pop. 1062. (2) A city of Middlesex co., Massachusetts, U.S.A., 10 m. from Boston. There are two anct. burying grounds and a public library. Manufs. include leather, chemicals, and machinery. Pop. (1930) 19,434.

Wodehouse, John, see KIMBERLEY, JOHN WODEHOUSE, FIRST EARL OF.

Wodehouse, Pelham Grenville, Eng. humorous author, b. Oct. 15. His best stories are the Jeeves series—*The Inimitable Jeeves* (1924), *Carry on, Jeeves!* (1925), and *Very Good, Jeeves* (1930); other good tales are *Piccadilly Jim* (1918), and *Summer Lightning* (1929). His *Louder and Funnier*, 1932, is a 'little volume of medita-

tions,' suggested by the *Encyclopædia Britannica*. W.'s humour is of the knock-about order, without malice, and creates its effect rather by energy than by design. Has also tried his hand at lyrics for musical comedies, especially in America. Was employed by the Metro-Goldwyn studios in Hollywood for a year. Other publications include *Love Among the Chickens*, 1906; *Psmith in the City*, 1910; *Leave it to Psmith*, 1923; *Psmith, Journalist*, 1915; and *Good-Morning, Bill* (a play produced in 1927 and based on the Hungarian of Ladislaus Fodor).

Woden, see ODIN.

Woffington, Margaret, known familiarly as Peg Woffington (c. 1714-60), an Irish actress, played in Dublin from 1732 to 1740. Her London début was at Covent Garden under Rich in *The Recruiting Officer* (1740). She also acted at Drury Lane and lived for some years with Garrick. She often appeared in male characters, notably as Sir Harry Wildair in *The Constant Couple*. She excelled in comedy as a lady of high rank (Lady Plyant, Lady Betty Modish, Millamant, etc.), but also acted in tragedy. See Life by Molloy (1884), Daly (1888); Taylor and Reade, *Masks and Faces*, 1852; Reade, *P. Woffington* (introduction by Dobson), 1899.

Wöhler, Friedrich (1800-82), a Ger. chemist, b. in Eschersheim. He was aided greatly in his early studies by his father, and studied medicine at Marburg and Heidelberg, completing his chemical studies under Berzelius at Stockholm. From 1836 he was professor of chemistry in the medical faculty of Göttingen University. His discovery of cyanic acid and the preparation of urea from it was his first entry into the realm of organic chemistry. His researches in conjunction with Liebig on cyanic and cyanuric acid founded the theory of isomerism; their joint work led to the discovery of the benzoyl radical, another great step in organic chemistry. W.'s work on another side led him to the isolation of the elements aluminium, beryllium, yttrium, and titanium. Amongst his writings are: *Grundriss der unorganischen Chemie*, 1831; *Grundriss der organischen Chem.*, 1832; *Praktische Übungen in der chem. Analyse*, 1854.

Woking, a market tn. of Surrey, England. The London Necropolis Cemetery (1864) and Crematorium (1878) are at Brookwood, 3 m. distant. Near by are barracks, a home for disabled soldiers and sailors, and the co. asylum. Pop. (1931) 29,930.

Wokingham, Oakingham, or Ockingham, a mun. bor. of Berkshire, England, bordering on Windsor Forest. There are an anct. parish church, a Gothic town-hall (1860), and the famous 'Rose' inn, where Pope, Swift, Gay, and Arbuthnot composed the ballad of *Molly Mog*. Some of the alms-houses date from 1451. W. was noted for bull-baitings till about 1821, and became a mun. bor. in 1885. An annual fair is held. Pop. (1931) 7295.

Wolcott, John (1738-1819), wrote satires and lampoons under the pseudonym of 'Peter Pindar,' which were popular in their day and have still a historical value. There is a breadth and licence about his writing that made him superior in this field to his many contemporaries. Among his best works are the *Lyric Odes to the Royal Academicians* and *The Lousiad*. The complete edition of his works was pub. in 1812.

Wolf (*Canis lupus*, Linn.). Lieut.-Colonel Hamilton Smith makes *Lupus* the first section of his first sub-genus, *Chaon*, of the *Diurnal Canidae*, or Canine group furnished with a round pupil of the eye. In this section he comprises the common W. (*Lupus vulgaris*), the black W. (*Lupus Lycaon*), the dusky W. (*Lupus nubilus*), and the W. of the southern states of N. America (*Lupus Mexicanus*, Smith). In the second section (*Lycisus*) he places the N. American W. (*Lycisus latrans*) and the Caygote of Mexico (*Lycisus cagottus*, Smith). The common W. of Europe (*Canis lupus*), of which the black W. (*Canis Lycaon*) is probably only a variety, is distributed throughout Europe generally and a great part of Asia.

'Wolf.' The name of a Ger. auxiliary cruiser which in the course of fifteen months' raiding in the Atlantic, Indian, and Pacific Oceans during the Great War is believed to have sunk ten ships of 32,844 aggregate tonnage. These included five British, three American, one Spanish, and one Japanese boat. She returned to enemy waters unscathed, entering Pola on Feb. 24, 1918.

Wolf, Friedrich August (1759-1824), a Ger. classical scholar, b. at Hainrode, near Nordhausen. It was at Nordhausen, under the guidance of Hake, that he conceived the love of antiquity which never forsook him. From the same scholar he also learned to depend for his conclusions primarily upon his own study and judgment. His love of private study brought him the disfavour of Heyne and others at the University of Göttingen, since it made his attendance at lectures extremely erratic.

Though W. gave the best of his energies to the work of personal teaching, his literary production was great. In 1782 he pub. an annotated edition of Plato's *Symposium*, and this was the first of many editorial labours. In 1789 there appeared his *Prolegomena ad Homerum*. In April 1824 he went to France for the good of his health, and d. at Marseilles.

Wolf, Hugo (1860-1903), a composer, b. at Vienna. At an early age he entered the Conservatorium, where he made the acquaintance of Gustav Mahler. His life was uneventful, and was passed in the direst poverty. W. wrote an opera, *Der Corregidor* (1895), but it was a failure; and his two choral works with orchestra, *Die Christnacht* and *Der Fenerreiter*, are seldom heard; but he has achieved a great fame for his splendid songs, which number almost 500. In 1897 he began a second opera, *Manuel Venegas*, but left it unfinished on account of a brain disease, culminating in insanity.

Wolfe, Charles (1791-1823), an Irish poet and clergyman, ordained 1817. His best-known poem is *The Burial of Sir John Moore* (1816-17). His *Remains* with memoir by Russell appeared in 1825. Litton Falkiner edited his poems in 1903. See *Blackwood's Mag.* (March 1826); *Notes and Queries*, 7th and 8th series; O'Sullivan's *College Recollections* (1825).

Wolfe, Humbert, Eng. poet; b. 1885. Educated: Bradford Grammar School; Wadham College, Oxford. Entered Civil Service, 1908. Principal assistant secretary Ministry of Labour from 1918. C.B., 1925. His poetic works include: *The Unknown Goddess*, 1925; *Lampoons*, 1925; *Humoresque*, 1926; *News of the Devil*, 1926; *Requiem*, 1927; *Cursory Rhymes*, 1927; *The Silver Cat*, 1928; *This Blind Rose*, 1928; *The Uncollected City*, 1930; *Early Poems* (collected), 1930. Prose: *Dialogues and Monologues*, 1928; *Notes on English Verse Satire*, 1929; *George Moore*, 1931.

Wolfe, James (1727-59), Eng. soldier, b. in Westerham, Kent, and joined the army in 1741, he and his brother, Edward, taking part in the Battle of Dettingen (1743). In 1745 W., now a lieutenant, was sent to Scotland under Cumberland to assist in crushing the rebellion in support of the Young Pretender. During the Seven Years' War, W. was picked out by Pitt, the Secretary of State, and placed in charge of Britain's operations in America under Amherst. In 1758 the task was assigned to W. of taking Louisbourg, and this he accomplished successfully in July, but not

until the Fr. commander, Drucour, had delayed the British until it was too late in the season to attack Quebec. The capture of Louisbourg was the first signal success of the Eng. and in Nov. W. returned to England. In 1759 he was promoted major-general and given the command of the expedition against Quebec. In May W. reached Louisbourg. He had with him three brigadier-generals, Monckton, Townshend, and Murray, with 9000 soldiers. Admiral Sandus was in command of a fleet of forty-nine men-of-war with 14,000 marines. On June 26, after a twenty days' voyage up the St. Lawrence R., W. reached the western end of the Island of Orleans and began the twelve weeks' siege of Quebec. The first attempt at assault on July 31 failed. Later by distracting the attention of the Fr. by surprise attacks in other quarters, W. succeeded in placing an army on the heights called the Plains of Abraham. Marquis de Montcalm, the courageous Fr. commander, at once gave battle. The Eng. were victorious, and W., three times wounded, died in the hour of victory. On the spot where he fell is erected a monument, bearing the inscription, 'Here Died Wolfe Victorious.' See R. Wright, *Life of Wolfe*, 1864; H. R. Casgrain, *Wolfe and Montcalm*, 1905; B. Willson, *Life and Letters of Wolfe*, 1909; J. T. Findlay, *Wolfe in Scotland*, 1928; A. E. Wolfe-Aylward, *Pictorial Life of Wolfe*, 1928; W. T. Waugh, *James Wolfe: Man and Soldier*, 1929; F. E. Whitton, *Wolfe and North America*, 1929. See also CANADA; SEVEN YEARS' WAR.

Wolffenbüttel, an anct. tn. of Brunswick duchy, Germany, on the Oker, 8 m. from Brunswick. The library, built in imitation of the Rom. Pantheon (1723), where Lessing was librarian (1770-81), was transferred to a new Renaissance building (1887). (The *Wolffenbüttel Fragments* of Reimarus were edited by Lessing.) Machinery, leather, cork, and copper goods, preserves, cloth, and tobacco are manufactured. The Swedes defeated the Austrians here in the Thirty Years' War (1641). Pop. about 19,000.

Wolff, Pierre, Fr. playwright; b. Jan. 1, 1865, in Paris. Witty dialogue. Plays include: *Jacques Bouchard*, 1890; *Leurs Filles*, 1891; *Celles qu'on aime*, 1895; *Le Boulet*, 1898; *Le Secret de Polichinelle*, 1903; *L'Age d'aimer*, 1905; *Le Ruisseau*, 1907; *Les Marionnettes*, 1910; *La Cruche*, 1911; *L'Amour Défendu*, 1912; *Le Voile Déchiré*, 1919; *Les Ailes Brisées*, 1921; *Le Chemin de Dames*, 1921; *Les Deux*

Amants, 1922; *L'Ecole des Amants*, 1923.

Wolf-hound, see BORZOI or RUSSIAN WOLF HOUND.

Wolfram, a mineral from which the metal tungsten (*q.v.*) is extracted. Chemically, it is a mixture of iron tungstate (FeWO_4) and manganese tungstate (MnWO_4); it is widely distributed, frequently occurring with tin-ore. The chief localities are Malay, Spain, Australia, Colorado, and Tasmania.

Wolfram von Eschenbach (c. 1170–c. 1220), a poet or minnesinger of mediæval Germany, a native of Bavaria. He was the greatest poet before the revival of Ger. literature, and his *Parzival* (c. 1205), dealing with the quest of the Holy Grail, is considered one of the finest Ger. productions of the Middle Ages. In part it closely follows the *Perceval* of Chrétien de Troyes, but W. claims to have based his version on that of an unidentified Kiot of Provence. W. also wrote *Titurel*, a fragmentary introduction to the *Parzival*; *Willehalm von Orans* (c. 1216, an epic from the Fr. *Aliscans*); and lyrics, *Wächter (Tag) Lieder*.

Wolf Rock, a rock about 117 ft. high, 8 m. from Land's End, Cornwall, England, with a lighthouse.

Wolf's-bane (*Aconitum napellus*), a common purplish blue-flowered garden plant, so called from its use as a poison for wolves.

Wolgast, a seaport of Pomerania, Prussia, on the Peene, 33 m. from Stralsund. It was ceded to Sweden (1648), and after changing hands many times became subject to Germany (1815). Steel, chemicals, tobacco, and alcohol are produced. Pop. about 8000. See Heberlein, *Beiträge zur Gesch. der Burg und Stadt Wolgast*, 1892.

Wollaston, William Hyde (1766–1828), an Eng. natural philosopher and chemist, b. at E. Dereham. He took his medical degree from Caius College, Cambridge. Not succeeding in his profession, he turned his attention to chemistry, particularly in connection with platinum, palladium, and rhodium, and to optical invention. He received the royal medal of the Royal Society for his method of manufacturing platinum and rendering it available for instruments (particularly crucibles). He is noted as the inventor of the camera lucida and the goniometer, and for the discovery of dark lines on the solar spectrum, 1802. He founded the donation fund of the Royal Society, the Wollaston medal of the Geological Society, and served as a commissioner of the Royal Society on the Board of Longitude.

Wollin, an island of Pomerania, Prussia, with Usedom separating the Stettiner Haft from the Baltic. It is about 30 m. from Stettin, opposite the Oder's mouth. Wollin (pop. about 5000) on the Dievenow is the only tn.

Wollongong, a seaside resort of New South Wales, Australia, with trade in coal. Pop. (1929) 10,230.

Wollstonecraft, Mary, see GODWIN, MARY WOLLSTONECRAFT.

Wolseley, Garnet Joseph Wolseley, Viscount (1833–1913), a British soldier, b. at Golden Bridge House, co. Dublin, of an old Staffordshire family. He was educated privately, and entered the army in 1852. A long career of active service commenced with the Burmese War of 1853, during which he was severely wounded in the left thigh. He was again wounded in the Crimea, where he served with the 90th Light Infantry. He received the cross of the Legion of Honour for bravery, and became captain at the age of twenty-two. He was present at the relief of Lucknow and at other engagements in the Indian Mutiny, becoming lieutenant-col. at the close of the war. He commanded the Canadian Red River expedition of 1870, and took part in the Ashanti War of 1873, receiving the thanks of parliament and various honours on his return home. In 1882 he was raised to the peerage (created viscount, 1885). Engaged in Egypt, he won the Battle of Tel-el-Kebir in 1882, and commanded the expedition which attempted to relieve General Gordon in 1884–85. He became commander-in-chief in Ireland in 1890, was made field-marshal in 1894, and from 1895 till 1900 was commander-in-chief of the forces. He pub. *The Soldier's Pocket Book for Field Service*, 1886; *Life of the Duke of Marlborough*, 1894; *Decline and Fall of Napoleon*, 1895; *The Story of a Soldier's Life*, 1903.

Wolsey, Thomas (c. 1475–1530), an Eng. cardinal, said to have been the son of a butcher, was educated at Magdalen College, Oxford, and took holy orders. He was presented to the living of Limington in 1500, and in the next year was appointed domestic chaplain to Henry Deane, Archbishop of Canterbury. Henry VII. made him one of his chaplains in 1507, and preferment followed preferment rapidly. He was made dean of Lincoln in 1509, canon of Windsor in 1511, dean of Hereford in 1512, and of York the next year, bishop of Lincoln in 1514, and later in the year Archbishop of York. Leo X. created him a cardinal in 1515. He had now for some time been consulted by the king on temporal matters. He directed the plan

of campaign against France in 1512, arranged the treaty of 1512 with that country and accompanied Henry to the Field of the Cloth of Gold. He was indeed virtually chief minister, and went as ambassador-extraordinary to France to conclude the Peace of Amiens in 1527. He served the king in the matter of the divorce of Catherine of Aragon, but, owing to delays in the proceedings, fell into disgrace, and was indicted in 1529, but pardoned the following year. In the last year of his life he was arrested for high treason, and died at Leicester on his way to London to refute the charge. His Life was written by George Cavendish (several editions); see also Lives by Galt (1846) and Belloc (1930); also A. F. Pollard, *Henry VIII.*, 1905.

Wolsingham, a small tn. of Durham, England, with an observatory. In a mining dist., it has marble quarries and manufs. steel and woollens. It is a civil parish of Weardale. Pop. (1921) 3535.

Wolverene, see GLUTTON.

Wolverhampton (Handone, *Wilfrunhampton*), a co. and parl. bor. of Staffordshire, England, 12 m. from Birmingham. It contains a free grammar school (founded 1515), a Blue-coat school (1710), a school of art, and various benevolent institutions. St. Mary's Church (later the Royal Free Chapel) was founded about 996. St. Peter's Church is old in parts, but was rebuilt (1865). The cap. of the 'Black Country.' W. has numerous blast furnaces, foundries and collieries, and manufactures locks, japanned goods, hardware, tools, motor cars and cycles, electrical machinery and plant, etc. Three members are returned to parliament. Pop. (1931) 133,190.

Wolverton, a small tn. of Buckinghamshire, England, near the Ouse. It has fine railway carriage shops and printing works. Pop. (1931) 12,870.

Womb, see UTERUS.

Wombat (*Phascogale wombat*), a burrowing marsupial of Australia and Tasmania. It is about 3 ft. long, with a short tail and a clumsy form. Has stout limbs and a blunt muzzle. Coat thick with long and coarse brownish-grey woolly hair. Head large, flat, and broad with small eyes and ears; fore-feet with five and hind-feet with four digits; soles broad and naked. The dentition resembles that of the Rodentia. The W. is nocturnal in its habits, feeds on vegetables, digging up roots with its claws. It is of small intelligence, but gentle and capable of domestication to a limited extent. It is hunted for its flesh, which is said to resemble pork.

Wombwell, a tn. of the W. Riding, Yorkshire, England, with extensive coal mines. Pop. (1931) 13,365.

Women, War Work of. At the outbreak of the Great War, women of training and experience volunteered in England for service as nurses both at home and abroad, or clerical or scientific work connected with hospitals. The Voluntary Aid Detachment (V.A.D.) organised by Dame Katharine Furse (q.v.), which had done fine work nursing in France, was in 1915 recognised officially as a department of the Red Cross. Later the Women's Emergency Corps was established for women who felt that their services could be more useful in other directions when the time was ripe for them, and in 1915 the Marchioness of Londonderry founded the Women's Legion, which did much work in connection with motor-transport. In the same year women clerks were admitted to the Army Pay Corps in order to release men for military service, and in the numerous temporary offices which came into existence. The Navy and Army Canteen Board employed women in cooking, catering, and waiting; while munition-making absorbed a large number of other women workers; many of these earned high wages, but at one time the mortality was heavy among those who were engaged in handling T.N.T. Women also acted as tram- and bus-conductors, and in numerous other ways as substitutes for men who had been called to serve in the forces. There were three principal organisations of women directly connected with the fighting forces: the Women's Army Auxiliary Corps (W.A.A.C.), later known as the Queen Mary's Army Auxiliary Corps; the Women's Royal Air Force (W.R.A.F.); and the Women's Royal Naval Service (W.R.N.S.). Popularly known as the Waacs, the Wrafs, and the Wrens, these women co-operated with the forces in clerical, domestic, and transport work which would otherwise have been performed by men fit for military service. The Women's Land Army was a highly organised body of well-trained workers engaged in agricultural labour, and in the care of domestic animals; it was grouped under the Food Production Department of the Board of Agriculture and directed by Miss (later Dame) Muriel Talbot.

Women's Clubs, General Federation of. This American organisation, which exists for the 'promotion of movements looking toward the betterment of life,' was founded in 1889, and chartered by Act of Congress, March 3, 1901. It is composed of

about 14,500 individual clubs grouped under dist. and country federations, governed by state federations. The very wide aims of the Federation embrace such schemes as the furtherance of international relations, the safeguarding of prohibition, the improvement of wireless and cinema programmes, the encouragement of the fine arts, the upholding of American home-life and citizenship, the increase of educational facilities, and the promotion of public welfare in general. The Federation has many minor aims, such as the exchange of Pan-American scholarship and the raising of a loan for medical scholarship. The official organ is *The Club-woman*, and the headquarters of the Federation are 1734 N. Street, N.W., Washington, D.C.

Women's Education, and, indeed, adult education generally, was but little developed until the second half of the nineteenth century. It was then that the universities began their activities in the form of extension and tutorial classes, and the state first made money grants to voluntary education societies and provided facilities through local education authorities. The growth of adult education has been at a much increased rate since 1921, when the British Institute of Adult Education undertook to revive public interest in the subject. Bodies whose primary object is educational and who promote adult education are the universities, the Workers' Educational Association, the Educational Settlements Association, the National Adult School Union, and the local education authorities. Tutorial classes are held by all universities in England and Wales. The object of the courses is to offer education of a university standard to those who for financial or other reasons are unable to enter a university. On joining a tutorial class the student undertakes to attend it for three years, to attend at least eighteen out of twenty-four classes and regularly to submit written work. The Workers' Educational Association organises two types of one-year courses. One is similar to the tutorial preparatory course, and the student has to attend twenty-four classes, do a certain amount of reading, and submit written work. The other one-year course consists of twenty 1½-hour classes, in which written work is not compulsory and the reading not exacting; in this course not fewer than two-thirds of the classes should be attended. In the university extension courses the number of classes at which attendance is compulsory is only eighteen, but students are

invited to attend a class after the lecture and to do written work. There are also terminal classes where the course lasts for twelve weeks only. Each meeting is of 1½ hours, varying in educational quality. Bodies whose object is not primarily educational include the Co-operative Union, Women's Institutes, and Rural Community Councils. These include adult education as part of their duties in the hope of leading students to more serious study. The London County Council, aids and maintains twenty-eight institutions in the metropolis at which advanced commercial subjects are taught to senior students. Students are prepared for commercial examinations, and the principal of any institution undertakes to advise students as to suitable courses of study to meet particular business requirements or in preparation for specified examinations. There are classes in all commercial subjects, Civil Service examination courses, dramatic art and elocution, music, sociology, upholstery, millinery, dressmaking, ladies' tailoring, cookery, arts and crafts, embroidery and design, eurhythmics, first aid, country dances, home nursing, home hygiene, home decorations, woodwork, infant care, laundry-work, lingerie, musical appreciation, singing, hair-dressing, domestic management in public institutions, training for colonial life, public health work, and miscellaneous subjects.

In the U.S.A. education for adult women has reached a high standard. Many of the university centres hold evening classes, known as extension classes, at cheap rates, and there are also, as in England, correspondence courses. Courses can usually be taken in the evening without an undue amount of travelling. The U.S.A. also provides courses for the illiterate members of its foreign pop. See also ADULT EDUCATION; EDUCATION.

Women's Suffrage. The movement in England for the extension of the franchise to women may be said to have had its intellectual origin in J. S. Mill's plea for perfect equality of the sexes in the essay entitled *The Subjection of Women* (1869). Mill held that 'the principle which regulates the existing social relations between the two sexes—the legal subordination of one sex to the other—is wrong in itself, and now one of the chief hindrances to human improvement; and that it ought to be replaced by a principle of perfect equality, admitting no power or privilege on the one side, nor disability on the other.' One effect such opinions as those of Mill had was the removal by the Married

Women's Property Act, 1882, of the disability under which a woman laboured prior to that Act of acquiring any property of her own. All that a woman could gain, whether by inheritance or otherwise, became *ipso facto* the property of her husband. For the twenty-five years between 1886 and 1911, W. S. was never once defeated in the House of Commons. Bills on W. S. passed their second readings six times between 1886 and 1911, but never proceeded beyond that stage. The debate in March 1907 on Mr. W. H. Dickinson's Bill resulted in that Bill being 'talked out.' The debate in 1913 on the amendments to the Government Franchise Bill of 1912 was the last occasion on which W. S. was before parliament prior to the Great War, when the debate turned on the resolution to omit the word 'male' in the first line of the first sub-section to clause one of the Bill (which ran, 'Every male person over 21 is qualified for registration in a constituency as a parliamentary elector if he resides or is an occupier of land or premises in that constituency,' etc.). Whether the academic listlessness that characterised the debate was to be attributed to the pressing demands on the time of the government exacted by the Home Rule Bill and other dominant issues, or to the extraordinary outbursts of organised violence, extending to depredations on private property, of the militant section of the supporters of female suffrage, may be an open question. At all events the loss of the amendment resulted in further violence and a series of incendiary outrages on country mansions, the consequence of which was the raiding of the headquarters of the Women's Social and Political Union by the police. This raid on the union's papers and the decision of the High Court, which held the funds of the union liable to answer damages for destruction of property by their agents, would appear effectually for a time to have burked the whole movement. Arising out of the continual breach of the law by the militant 'suffragettes' and the consequent wholesale imprisonment of large batches of women, parliament passed an Act, colloquially termed the 'Cat and Mouse Act,' which had for its object the rendering effective the imprisonment of women who nullified their sentences by 'hunger striking,' and defying all efforts forcibly to feed them in prison. During the War political questions were of no importance, but owing to the work performed by women during the War, opinion turned to the extension of the franchise in their favour, and Mr.

Asquith, as Prime Minister and a former opponent of the movement, said in 1916 that when the War came to an end he would not be able to deny the women's claim. In October of that year a conference was appointed to consider the franchise question and by a majority recommended that some form of W. S. should be conferred. Early in 1918 a Bill granting limited franchise to women was passed and ten years later, May 23, 1928, the Bill which equalised the franchise passed the House of Lords.

In the U.S.A. the struggle for W. S. was long-drawn, but when the country finally decided upon it, women over twenty-one were given the vote on the same terms with men. For many years, under the leadership of Susan B. Anthony and her successors, there had been organisations to obtain W. S. But their efforts were offset by other women's organisations which opposed the movement. The initial success came in 1869, when Wyoming, then a territory, gave women the suffrage. In 1893 the state of Colorado followed. Then followed, in turn, Utah, Idaho and Washington. Soon practically all the western states had enfranchised their women. But in the E. the movement met with defeat after defeat, notably twice each in Ohio and Michigan. The women won a signal victory in 1917, when the great state of New York voted for W. S. By this time the movement had attained great impetus. On June 4, 1919, the national Congress submitted a W. S. amendment to the constitution for action by the states. Many quickly ratified, but some of the southern states voted adversely. The women were anxious to have the vote for the election of November 1920. On March 22 the state of Washington became the thirty-fifth state to ratify. Thirty-six were needed. Delaware then voted adversely, but in August 1920 Tennessee ratified and the amendment became law. It is the 19th amendment and one of the shortest: 'The right of citizens of the U.S.A. to vote shall not be denied or abridged by the U.S.A. or by any state on account of sex. Congress shall have power by appropriate legislation to enforce the provisions of this article.'

See (Eng.) M. G. Fawcett, *Women's Suffrage, 1912*; Ray Strachey, *'The Cause': a Short History of the Women's Movement in Great Britain, 1928*; (U.S.A.) I. H. Irwin, *The Story of the Woman's Party, 1921*; C. C. Catt and N. R. Shuler, *Women Suffrage and Politics, 1923*.

Wood, in the widest sense, is all that part of a plant that exists be-

tween the pith and the bark; in a narrower sense, it is applied only to those bundles of tissue which are called woody tissue. The two great classes of plants, Exogens and Endogens, yield very different kinds of W. in consequence of the manner in which their fibres are deposited. Endogens have no bark and are generally hollow in the middle. The stems of Exogens are solid, and as the tree increases in age the W. becomes more solid. Hence a distinction is made between the centre of the W. of the trunk and its circumference, the one being called heart-wood, the other sap-wood.

Wood (or a Wood), Anthony (1832-95), an antiquary, b. at Oxford, and educated at Merton College. Dugdale's *Antiquities of Warwickshire* roused him to attempt the same task for Oxfordshire, and after six years' labour he produced *History and Antiquities of the University of Oxford*. He worked further at *Athenæ Oxonienses*, continuing Fell's idea. W. quarrelled with everybody, and was expelled from the university for libelling Edward, Earl of Clarendon. See Clark, *Life and Times of Wood* (Oxf. Hist. Soc.), 1891-97.

Wood, Ellen (better known as Mrs. Henry Wood) (1814-87), an Eng. novelist, contributed to the *New Monthly Magazine*, in 1861, her first work of fiction, *East Lynne*, which at once established her as a popular writer. Among her numerous stories are *Mrs. Halliburton's Troubles* (1862), *The Channings* (1866), *Within the Maze* (1872). The *Johnny Ludlows* tales were contributed in 1868 to *The Argosy*, a magazine of which she was proprietor and editor.

Wood, Sir Evelyn (1838-1919), British field-marshal, b. Feb. 9, at Cressing Vicarage, Essex; son of Rev. Sir John Page W. He first served in the navy, which he entered in 1852, and was with the Naval Brigade in the Crimea. Transferring his services to the army, he gained the Victoria Cross during the Indian Mutiny, and, having changed again from cavalry to infantry, he served through the Ashanti War with the rank of lieutenant-colonel. The Zulu War found him in the field again, and he commanded in the Boer War of 1881. In 1883 he raised the Egyptian army, becoming its commander-in-chief; and he served in the Nile Expedition of 1894-95. Quartermaster-General of the Forces, 1893-97; Adjutant-General of the Forces, 1897-1901. He commanded the Second Army Corps and Southern Command, 1901-04, and in 1903 was made a field-marshal. When the Territorial Force was formed he took an active part

in its organisation, becoming chairman of the City of London Association. G.C.M.G., 1882; G.C.B., 1897. See his autobiography, *From Midshipman to Field-Marshal*. Died at Midhurst, Harlow, Essex, Dec. 2.

Wood, Sir Henry Joseph, Eng. orchestral conductor; b. March 3, 1869, in London. Received musical instruction from mother. Assistant-organist: St. Mary's, Aldermanbury, 1879; St. Sepulchre's, 1882. Organist, St. John's, Fulham, 1886. Six terms, R.A.M. Organ-recitals at exhibitions, 1883-89. First conducted, Rousby Opera Co., 1889; afterwards, for Marie Roze, Carl Rosa Opera Co. and other opera and concert organisations, London and provs. Engaged by Robert Newman, 1895, for Queen's Hall promenade concerts: has ever since been identified with concerts there; has also organised provincial concerts, and conducted festivals. Knighted 1911. Visited America, 1904, 1925, 1926. Between 1895 and 1919 he produced over 200 Eng. works, many for the first time, and in addition Eng. people owe to W. most of their knowledge of the modern Russian, Ger., and Fr. schools.

Wood, Leonard (1860-1927), American general and administrator; b. Oct. 9, at Winchester, N.H.; son of a physician. Graduated in medicine, Harvard, 1884. Army-surgeon, 1885; same year saw service against Apache bands in Arizona. With Roosevelt, 1898, raised regiment of rough-riders for Cuban campaign. Commanded at Las Guasimas; Brigadier-general, July; Major-general, Dec. After period as military governor of Santiago, Governor-General of Cuba, 1899-1902. Governor of Moro prov., Philippines, 1903-05. Ambassador to Argentina, 1910. Chief of General Staff, 1910-14. In France, January 1917, wounded by shell. Candidate for Republican nomination for President, 1920. Governor-General, Philippines, from 1921. Died at Boston, Mass., Aug. 27.

Woodbine, a name formerly given to twining and climbing plants, including ivy. Shakespeare used it of the honeysuckle, but it is also applied to *Polygonum convolvulus*.

Woodbridge, a river-port and market tn. of Suffolk, England, at the head of the Deben's estuary, forming a sub-port of Ipswich (8 m. distant). Pop. (1931) 4735.

Woodburytype, see PHOTOGRAPHY, PROCESS WORK.

Wood-carving, see CARVING.

Woodchuck, see MARMOT.

Woodcock, or *Scolopax rusticula*, a game bird, which in recent years has become much more numerous in

Britain, and breeds in most counties. It is a favourite bird with sportsmen and is much valued for the table. The great majority occurring in Britain are migrants, arriving chiefly in October. The ability of the parent birds to carry their young, pressed between the legs and breast, to feeding grounds has long been established by naturalists. The W. is about 14 in. long, and its plumage is brown-grey and buff with black markings. The American W. is *Philohela minor*.

Woodcuts. The art of woodcut and wood engraving together form the craft of xylography, while lino-cutting is a more recent development. A woodcut is a print taken from a prepared block of soft wood, sawn with the grain, such as beech, apple, pear or sycamore. The block is carved with a small knife, graver and gouge. A wood-engraving is printed from hardwood, cut across the grain. Woodcuts generally may depend for their beauty on balance of black and white masses, or design of white lines on black and less legitimately on black lines left standing against a cut-away white background. The method of cutting is to scoop the design upon the block with a gouge rather than to cut it away with a knife. Gouges may be lozenge-, square-, V-, or round-shaped. To print the cut the block is covered with printing ink from a roller. Japanese paper is then placed upon the block and is rubbed first with a burin and later with a burnisher until the desired density of the print is obtained. It is not usual to print wood blocks in a printing press except for commercial purposes. Wood-block designs were used upon fabrics long before they were printed on paper. Printed cloths were brought from India to the Near East before the reign of Alexander the Great. It was not until paper making became general that W. were used for book illustrations. The earliest extant example of a woodcut is believed to date from A.D. 1418. In the fifteenth century block books in which text and illustrations were cut on wood, were produced in Germany and the Netherlands. Dürer and Holbein were the greatest early masters of the W., while excellent work was produced in Spain, France, and Italy. Esop, Terence, and Boccaccio, and later the works of herbalists were illustrated with W. In the eighteenth century W. were used as decorations of popular prints and rhyme sheets. An Englishman, Thomas Bewick, produced firm naturalistic work, using the white line method. After Bewick, in the

nineteenth century, Burne-Jones, Morris, Shannon, Rickets, and George Moore, all developed the art of W. Later artists who use this medium are Gill, Gwendolen Raverat, Paul and John Nash, Gibbings, while Claude Flight and W. Kermode are distinguished for their linocuts. The Japanese W. is usually a colour print and differs from the European method of W. printing, the blocks being printed with rice-paste colours on wet paper. See Laurence Binyon and J. J. O'Brien Sexton, *Japanese Colour Prints*, 1923; H. Furst, *Modern Woodcut*, 1924; Gordon Craig, *Woodcuts and Some Words*, 1924; D. P. Bliss, *A History of Wood Engraving*, 1928.

Wood Green, an urban dist. of Greater London, in Middlesex, England. The Alexandra Park and Palace are close by. Pop. (1931) 54,190.

Wood-ibis, see TANTALUS.

Wood-lice, name given to isopod crustaceans of the family Oniscidae. Though they have all become adapted to terrestrial life, they find damp necessary to their existence, and some species, notably *Ligia oceanica*, which is over 1 in. long, are confined to the seashore. The food of W. is entirely vegetarian, and they are mainly nocturnal in their habits. The oval body consists of a small head, seven-segmented thorax, each segment bearing a pair of legs, and abdomen, the appendages of which are the respiratory organs. *Oniscus aspidio* does damage in gardens.

Wood Naphtha, see PYROXYLIC.

Woodpeckers (Picidae), a family of Scansorial birds. The Picidae are especially constructed for climbing up the bark of trees, and for obtaining from the crevices thereof the insects which constitute their food. The feet, though very short, are unusually strong; the nails are broad and crooked, and the toes placed in pairs, that is, two forward and two backward. As an additional and powerful support in their ascent of the trunks of trees, their tail feathers terminate in points, and are uncommonly hard, so that when they are pressed against the bark they assist the birds in their progress or in keeping their position. The bill is wedge-shaped, furnished with regular-sided angles, and in one species (*Picus principalis*) nearly of the colour and consistency of ivory, whence it has been termed the ivory-billed W.

Wood-preserving, see TIMBER.

Wood-pulp consists of wood fibre which has been reduced to a pulp either mechanically, by grinding wood under water, or chemically, by boiling small pieces of the wood with

caustic soda or calcium bisulphite under pressure. The wood most generally used is poplar, and the pulp is used in the manuf. of paper (q.v.).

Woodruff, or *Asperula*, a genus of small plants (order Rubiaceae). The sweet W. (*A. odorata*) is a common perennial in woods and is often gathered and dried for its persistent odour of new-mown hay.

Wood-sorrel, see **SORREL**.

Wood-spirit, see **PYROXYLIC**.

Woodstock: (1) A market tn. of Oxfordshire, England, on the Glyme. W. was the residence of some of the Eng. kings. After Blenheim (1704), the place was granted to the Duke of Marlborough, Blenheim Palace being erected near by. Glove-making is carried on. Pop. (1931) 1485. (2) A port of entry and summer resort of Ontario, Canada, cap. of Oxford co. Leather, furniture, and pianos are manufactured. Pop. (1926) 9935.

Woodwork, see **CARPENTRY**; **CARVING**; **FURNITURE**; **INLAYING**; **JOINERY**; **MARQUETRY**; **PYROGRAPHY**.

Wool, the soft, curly form of hair worn by some animals, useful to them in preventing loss of body heat, and adapted by man to the manuf. of textiles for clothing. From the biological point of view, there is no definite line to be drawn between hair and W. The coats of the merino and Eng. breeds of sheep are *par excellence* known as W., while the term is also applied to the fibres obtained from the llama, the Peruvian sheep, the Angora goat, and, perhaps more debatably, to cashmere, camels' and Angora rabbits' hair. The W. of the Angora goat, however, is more generally known as *mohair*. The goat was originally an inhabitant of Asia Minor, and the weaving of mohair goes back to Biblical times. In the nineteenth century the Angora goat was exported to South Africa, the U.S.A., and Australia. In the U.S.A. especially where the domestic breeding of Angora goats numbers nearly four million, the mohair industry is a flourishing activity, and it was owing to an American invention that power was first applied to mohair weaving processes. Microscopically, W. is distinguished by the possession of a serrated structure. The core of the fibre is enclosed in funnel-shaped sheaths which overlap each other, producing the saw-like outline only perceptible under the microscope. The serrations are numerous in the finest Ws., and it is to the existence of these minute irregularities that W. owes its property of matting or felting into a compact mass, and, consequently, its value as a fibre for textiles. Chemically, W. consists of

carbon, hydrogen, nitrogen, oxygen, and sulphur. When burnt it gives off an odour of ammonia gas, and leaves as a residue small bead-like masses of carbon. This latter property serves to distinguish it from vegetable fibres which leave no perceptible masses of carbon when burnt. The properties desired in W. for manufacturing purposes are length of staple, staple being a lock or matted collection of fibres, strength and uniformity of fibre, elasticity, lustre, fineness of fibre, and freedom from impurities in the shape of dead fibres, foreign matter, etc. The weaving of woollen fibres appears to have been practised at a very early date. Herodotus mentions that the Babylonians were clothed in woollen tunics, and the Hellenic peoples were well versed in the art of weaving. The sheep was a domestic animal among the early Britons, and there is little doubt that they wore woollen garments, fashioned either by weaving or by beating masses of W. into felt. The Romans understood all the essentials of the W. manufacturers' craft, and they carried their knowledge into the countries conquered and settled by them. A woollen factory was established in Winchester in Roman times, and its products were known on the Continent of Europe. Throughout the Middle Ages the chief centres of the woollen manuf. were on the Continent, notably in Flanders. Efforts were made at various times to establish the industry securely in Britain. Flemish weavers were introduced into Carlisle under royal protection in the reign of William I., and a colony was afterwards founded in Pembrokeshire. Notwithstanding this encouragement, a great proportion of the W. grown in England was exported to Flanders, and Edward III. prohibited this export with a view to stimulating home industries. The prohibition was removed by Queen Elizabeth, but again from 1660 to 1825 the export of W. was forbidden. The constant encouragement given to woollen manufacturers led to large areas being turned into pasture land for the provision of the raw material, with the result that Eng. industry took a bias against the more intensive forms of agriculture. The development of machinery had the effect of concentrating the greater part of the industry on the northern coal-fields, and the southern centres gradually dwindled or persisted as seats for the manuf. of certain specialised products. In later years the supply of the raw material from Britain and Europe has been almost negligible, the chief importations being from Australia, New Zealand, and S. Africa. In America the

woollen manuf. was not established on factory lines until the end of the eighteenth century. The breed of sheep recognised as the best for W. purposes is the merino. Originally a Spanish sheep, it has made its way into all quarters of the world. In 1765 it was introduced into Saxony and crossed with the best Saxon breeds. Subsequently it was introduced into other parts of Europe, and, in 1809, 4000 were imported into the U.S.A. Merino sheep were introduced into Australia at the end of the eighteenth century, and the colonists set about growing W. to supply the European market. The enterprise was not at first a success, but owing to the efforts of men like Captain MacArthur the quality of the W. and facilities for commerce were improved. When the frozen-meat trade occupied so much attention in Australia and New Zealand, the danger arose that the good wool-producing qualities of the sheep would be sacrificed to mutton. The danger has been averted, owing mainly to improved knowledge of breeding from the scientific point of view. Good cross-bred W. is now exported from the coastal dists., while the native merino still holds its own in the interior. An attempt has been made to supplement the Australian merino strain with the Vermont or American merino, but the heat and dryness of the climate are against the American sheep. The merino was introduced into S. America at a later date, and was crossed with Fr. breeds. The introduction of Eng. breeds has had the effect of producing a good cross-bred W. The Dutch introduced the merino into S. Africa, where it has flourished with little need for cross-breeding. The woollen manuf. is divided into the 'woollen' and 'worsted' trades, the general distinction being that in the latter long fibres are used. In the woollen trade not only are short fibres employed, but all kinds of re-manufactured materials and by-products are used. These comprise *noil*, the short fibres rejected in the combing operation for worsteds; *mungo*, the shreds of previously manufactured clothing; *shoddy*, the shreds of softer materials, as blankets, shawls, etc.; *flocks*, collections of fibre from the machines used in the various processes. Sheep's W. is sometimes washed before shearing; the process rids the fleece of extraneous dirt, but it also removes much of the natural grease. In shearing, the fleece should be clipped off in one continuous piece, the W. being rolled up and secured by a simple knot. The fleeces

are then classified according to quality as a preliminary to the work of the sorter or stapler, who divides each fleece into separate qualities, as the W. deteriorates in value from the shoulders to the tail of the animal. The operation of sorting requires discrimination and a regard for cleanliness, as anthrax is not uncommonly contracted through infection from the W. of diseased sheep. Whether the sheep have been washed prior to shearing or not, it is necessary except in the production of yarns to wash or 'scour' the W. before proceeding to the manuf. This is done by agitating the W. with suitable machinery in a bath containing a mild alkali. It is then uniformly dried, usually by steam heat. The next operation is to disentangle the matted fibres of the fleece. To effect this the W. is fed into a 'wiley,' consisting of a large drum and three small cylinders armed with spikes, in such a manner that the entangled fibres are pulled apart as they pass between the cylinders. W. is then usually 'blended.' That is, Ws. of different kinds and W. substitutes, in proportions suitable for the purpose in view, are spread in layers forming a stack, each layer being oiled as it is put down. The stack is beaten down with sticks, after which it is passed through a *fearnought* to ensure that the various fibres are adequately mixed. 'Scribbling' or 'carding' is an operation by which the mass of fibres is more perfectly mixed and rendered suitable for spinning. The carding machine consists of a series of rollers set with pins somewhat bent. The wool is taken up from the feed by the first cylinder or 'licker-in' and is stripped from that by another cylinder, or 'angle stripper,' from which it is removed by the pins of a large cylinder usually called the 'swift.' As the W. is carried forward by the swift, all fibres which do not lie closely on the cylinder are removed by 'workers,' cylinders from which the fibres are removed by still more cylinders to a point farther back on the swift. It is seen, therefore, that only fibres setting close to the cylinder survive to be taken off by the 'doffer.' Essentially, the carder consists of a number of cylinders with an enormous number of teeth which work the W. into a 'sliver,' a continuous film of fibres. The film is divided up into narrow strips which are passed between rubbers so as to give a circular section. The sliver is now a long rod of pith-like W., with no twist, and therefore capable of being stretched to a considerable extent. The attenuation and twisting required to convert the sliver into

yarn of the requisite count are performed by means of the 'spinning mule,' a machine of somewhat complicated construction, though the operation is simple. For the preparation of worsted yarn, an operation known as 'combing' is necessary. This is performed by a machine which separates from the mass all the fibres above a certain length and imparts a high degree of parallelism to them. After spinning, therefore, worsted yarn presents a clearer-cut appearance than woollen yarn, which remains fluffy in appearance. The principles of weaving are similar to those employed in other textiles. Dyeing may be performed at almost any stage of the process, given the necessary cleansing preliminaries. Certain finishing operations, as mending, scouring, tentering, etc., vary according to the nature of the fabric. Woollen cloths are known as tweeds, meltons, doeskins, buckskins, etc., and are characterised by softness and elasticity. Worsteds form the largest class of suit and dress materials; they make up with excellent finish, keep their shape well, but are apt to become glossy with wear.

Consult Alfred F. Barker, *Woollen and Worsted Spinning*; Robert Beaumont, *Wool Substitutes*; E. Lipson, *The History of the English Woollen and Worsted Industries*; H. Priestman, *Principles of Woollen Spinning*; J. W. Radcliffe, *Manufacture of Woollen and Worsted Yarns*.

Woolf, Leonard Sidney, Eng. author, b. Nov. 25, 1880. Educated St. Paul's School and Trinity College, Cambridge. Entered Ceylon Civil Service, 1904. In 1912 he married Virginia W. (q.v.), and together they founded the Hogarth Press in 1917. W. edited *The International Review*, 1919, and was Literary Editor of *The Nation*, 1923-30. Books include: *The Village in the Jungle*, novel, 1913; *International Government*, 1916; *Empire and Commerce in Africa*, 1920; *Socialism and Co-operation*, 1921; *Essays*, 1927; *Hunting the Highbrow*, 1927; *Imperialism and Civilisation*, 1928.

Woolf, Virginia, Eng. novelist; youngest daughter of Sir Leslie Stephen, K.C.B. Educated at home. Married, 1912, Leonard Sidney Woolf (q.v.). Her principal works are: *The Voyage Out*, 1915; *Night and Day*, 1919; *Monday or Tuesday* (sketches), 1921; *Jacob's Room*, 1922; *The Common Reader* (essays), 1925; *Mrs. Dalloway*, 1925; *To the Lighthouse*, 1927; *Orlando* (story of an Elizabethan gentleman who fell into a trance and came to life as a woman in later times—'one of the most admired books of the

year'), 1928; *A Room of One's Own* (essay), 1929; *The Waves*, 1931. V. W.'s theory of fiction may be deduced from her own words in *Mr. Bennett and Mrs. Brown*, a lecture delivered 1924: 'It is to express character—not to preach doctrines, sing songs, or celebrate the glories of the British Empire, that the form of the novel . . . has been evolved.' She specifically contemns elaborate scenic description, and the tradition that 'laid enormous stress upon the fabric of things.' Her backgrounds are indicated with the faintest sketchiness; while her living, brilliantly depicted characters are constantly close-up.

Woolley, Charles Leonard, British archaeologist; b. April 17, 1880; son of Rev. Geo. Herbert W. Educated: St. John's, Leatherhead; New College, Oxford. Assistant-keeper, Ashmolean Museum, Oxford, 1905-07. Made excavations at Corbridge, 1906-07. Excavated in Nubia for the Eckley B. Coxe, jun., Expedition, 1907-11. In Oxford University Expedition to Nubia, 1912. British Museum excavations at Carchemish, 1912-14. Archaeological work in Sinai for Palestine Exploration Fund, 1914. In Field Artillery intelligence service, Egypt, 1914-16. Prisoner in Turkey, 1916-18. In political department, N. Syria, 1919. Excavations: at Carchemish, 1919; at Tel al Amarna for Egypt Exploration Society, 1921-22; at Ur, 1922-30. Publications include: *Dead Towns and Living Men*, 1920; *Excavations at Ur of the Chaldees*, 1923 (and six books in continuation of the subject, 1925-30); *Excavation at Tel el Obeid*, 1925; *The Sumerians*, 1928; *Digging up the Past*, 1930.

Woolley, Frank Edward, Eng. cricketer; b. May 27, 1887, at Tonbridge. Pupil of Captain McCanlis, Tonbridge Nursery. Left-handed batsman and bowler, Kent. First regular season in co. club, 1906. In 1907, made 1034 runs in County Championship. In 1908, at Lord's, took 6 wickets for 8 runs within 5 overs. Fielder and W. in 1909 made 235 for tenth wicket, Kent v. Worcestershire. In 1909-10, W. first played in S. Africa; in 1911-12, in Australia. Highest score 305 not out, against Tasmania.

Woolman, John (1720-72) an American Quaker essayist and preacher; spent his life after about 1743 in preaching against slavery and espousing the cause of negroes and Indians. He came to England (1772) to visit Friends in London, York, and elsewhere. His writings include his *Journal* . . ., 1775 (ed. with Whittier's introduction 1871); *Considera-*

tions on Various Subjects of Importance . . . , 1773; *A Word of Remembrance and Caution to the Rich*, 1793. See his *Collected Works*, 1774-75, 1800; the pamphlet *St. John Woolman* (London), 1864.

Woolsack, the seat of the Lord High Chancellor (see under CHANCELLOR) in the House of Lords, being a large square bag of wool, without back or arms, covered with red cloth.

Woolsey, Theodore Dwight (1801-89), an American educationist, publicist, and Congregational minister; studied at Yale, Princeton theological seminary, and in Germany (1827-30). He became president at Yale (1846-71), and was chairman of the American Commission for revising the A.V. of the N.T. (1871-81). He edited Plato's *Gorgias* and plays of the great Greek tragedians, and wrote: *Introduction to the Study of International Law*, 1860; *Communism and Socialism*, 1880; and *Political Science*, 1877.

Woolsorter's Disease, see ANTHRAX.

Woolwich, a metropolitan bor. of London, England, formerly a separate tn. of Kent (partly also in Essex, N. Woolwich), on the Thames. Greenwich and Lewisham bound it on the W. The famous Royal Arsenal (E.), with its foundry, furnaces, pattern room, and laboratory, developed from the armoury at Tower House in Woolwich Warren (established 1585). In 1922 it was used for making locomotives, tractors, etc. The cannon foundry was moved from Moorfields to W. (about 1716) under the direction of Andrew Schalech of Douai. Other important buildings are the Royal Military Academy (1719, present building dating from 1805), the Artillery Barracks (1775), Royal Artillery College, Royal Military Repository, and the Rotunda. The Brook fever hospital is at Shooter's Hill. Woolwich Dockyard rose to great importance under Henry VIII., but was closed (1869) and made over to the War Office as a depot (1872). There are brick and tile kilns and pits of chalk and sand, and many Rom. remains have been discovered near by. Two members are returned to parliament. Pop. (1931) 146,945.

Woolworth, Frank Winfield (1852-1919), American merchant; b. April 13, at Rodman, N.Y. Educated New York Business College. Opened 'five-cent' store, Utica, N.Y., February 1879; removed, June 1879, to Lancaster, Pa. Came to have about 1000 'five-and-ten-cent' stores, U.S.A. and Canada; seventy-five similar concerns, Great Britain. President: F. Woolworth

Co. (q.v.) (incorporated 1912); whose building was, at erection, the highest in New York. Died on Long Island, April 8.

Woolworth Co., The F. W., one of the largest chain-store organisations in the world, its idea being originated by F. W. Woolworth (1852-1919). He started a small store in Utica, New York, in 1879, his plan being to sell a large assortment of useful articles at a very small price. The venture was not a success, but he started once more, this time in Lancaster, Pa. Making it pay, he gradually opened more stores of the same kind in neighbouring tns. The basic idea was to sell nothing in the store at a cost greater than five or ten cents; to keep no books, and hence to sell for cash only; to make no deliveries, and hence further to cut the overhead cost; and, finally, as he opened more shops, to buy things in large quantities from factories, getting the advantage of low prices and a large discount for cash payment. In 1912 the present company was incorporated with 600 shops. It now has over 1800 in the U.S.A., and subsidiary companies have some 300 in Great Britain and thirty-five in Germany.

Woonsocket, a city of Providence co., Rhode Is. (N.), U.S.A., on Blackstone R., about 15 m. from Providence. Centre of a group of manufacturing villages, it produces cottons, worsteds, bobbins and shuttles, india-rubber goods, and foundry products. Pop. (1930) 49,376.

Woorali, name for curare (q.v.).

Wooster, co. seat of Wayne co., Ohio, U.S.A., on Killbuck Creek, about 50 m. from Cleveland. Agricultural machinery is manufactured. It contains the (Presbyterian) University of W. (1870), and the Ohio agricultural experiment station. There are coal, lumber, and glass industries. Pop. (1930) 10,742.

Worcester (Saxon, *Hwicwara-ceaster*): (1) A parl. co., and mun. bor., episcopality, market tn., and co. in itself, the cap. of Worcestershire, England, on the Severn, 25 m. from Birmingham. It contains an anct. cathedral (the city has been the seat of a bishop since 680), a grammar school (1541), and other notable buildings. Every three years the musical festival of the 'Three Choirs' is held here (other years at Gloucester or Hereford). The Royal Worcester Porcelain Works (1751) are noted. Worcester sauce, vinegar, and boots and shoes are manufactured also, and there are iron and engine works. Cromwell here defeated Charles II. (1651). Pop. (1931) 50,500. See works by Green (1796),

Noake (1849), Walcott (1866), Smith and Onslow (1883); *Victoria County History*. (2) A tn. and dist. of Cape Colony, S. Africa, on the Breede and Hex Rs., 109 m. from Cape Town. Much wine and brandy are produced, also raisins; there are tanneries and wagon works, and thermal springs near (at Brandvlei). Pop. (1921) 8512. (3) City and co. seat of Worcester co., Massachusetts, U.S.A., 44 m. from Boston. The Blackstone, Chicopee, and other rvs. afford a plentiful water supply. There are fine public buildings and parks, loom and envelope manufactories, foundries, wire works, wool and silk mills, and manufs. of tools, firearms, boots and shoes, and carpets. W. was known as 'Quinsigamond' till 1684. Pop. (1930) 195,311. See *History of Worcester* by Hersey (1862), Hurd (1889), and E. Ward (1930); also H. H. Leicester, *Forgotten Worcester*, 1930.

Worcester, Edward Somerset, second Marquis of (1601-67), an Eng. royalist, known as Lord Herbert till 1644, and as Earl of Glamorgan (1644-46). He served King Charles in Ireland (1644-45), but his secret negotiations with the Irish Rom. Catholics miscarried, Charles refused to support him and he was imprisoned. He lived in France from 1648-52, when he was again imprisoned for a time. His mathematical and mechanical researches were conducted with the help of C. Kaltoff, and he invented a kind of steam-engine for 'driving up water by fire,' described in his *Century of the Names and Scantlings of Inventions* . . . (first printed 1663). He erected water-works at Vauxhall.

Worcester, Florence of, see FLOR-ENCE OF WORCESTER.

Worcester College, one of the colleges of Oxford University, in Worcester Street, founded (1714) by Cooke's bequest. The site was partly occupied as early as 1283 by Gloucester Hall (founded for Benedictine monks). In 1542 this was used as the palace of the Bishop of Oxford. See *Oxford University Calendar*; Clark, *Colleges of Oxford*, 1891; Smith (1895), Wells (1899); Headlam, *Oxford and Its Story*, 1904.

Worcestershire, a midland co. of England, bounded N. by Staffordshire, S. by Gloucestershire, E. by Warwickshire, and W. by Herefordshire and Shropshire. The surface varies, the S. and S.W. being hilly, while through the centre run the riv. valleys, with the Lickey and Clent hills in the N. The principal range is that of the Cotswold Hills in the S. with Bredon Hill, while the Malvern Hills in the S.W. reach a height of 1395 ft. in Worcester

Beacon. The Severn is the chief riv., with its tributaries the Teme, Stour, and Avon, forming the vales of Worcester (Severn), Teme and Evesham (Avon), the most fertile part of the co. It is well wooded and contains the two anct. forests of Wyre and Malvern Chase. The co. is famous for its orchards and market gardens; and hops are also grown; almost the whole co. is under cultivation, rather more than half being devoted to permanent pasture; wheat and oats are the main crops. Coal is mined and ironstone, limestone, and salt are also found. Droitwich and Stoke Prior are noted for their brine springs. Worcester is famous for the manuf. of porcelain dating from 1751; and Kidderminster for carpets; while in the N. are a group of tns., Dudley, Netherton, etc., included in the Black Country, where iron-work of all kinds is carried on. Other manufactures are needles and fishing tackle, glass, and gloves at Worcester. Canals connect the Severn with other rvs. and the railway service is good. Worcester is the co. tn., other important tns. being Bewdley, Droitwich, Dudley, Evesham, and Kidderminster. The co. returns four members to parliament. The greater part of the co. was at one time in the hands of the church, and there were no less than thirteen great monastic foundations. Of these there are the ruins at Pershore and Evesham, both dating from the eighth century, Worcester Cathedral, and the priory church at Malvern also of the same date; and ruins at Halesowen, Bordesley, and Astley dating from the thirteenth century. The area is 447,678 acs. Pop. (1931) 420,156. See *Victoria County History: Worcester*; F. T. S. Houghton, *Worcestershire*, 1922; A. Mawer and F. M. Stenton, *Place Names of Worcestershire*, 1927.

Worcestershire Regiment. A British regiment, formerly 29th and 36th Foot. 29th raised 1694. Served under Marlborough and took part in American War, 1776-77. A detachment served in Lord Howe's fleet on 'the Glorious 1st of June,' 1794, for which it was granted the Naval Crown as a badge. Served under Wellington in Peninsula with great distinction. Took part in several Indian campaigns. 36th raised 1701 and was organised for 'sea-service.' Served in Spain, Nova Scotia, Flanders, before going to India in 1783. The regiments were linked in 1881 and took part in S. African War, 1899-1902. During Great War raised twenty-two battalions, and served in France, Flanders, Italy, Macedonia, Gallipoli, Egypt, Mesopotamia, and Persia.

Gained great distinction for saving the Channel ports from capture by Gers. at Gheluvelt, Oct. 31, 1914.

Worde, Wynkyn (or Winkin) de, or Jan van Wynkyn, a printer, who came to England from Alsace-Lorraine, and helped Caxton from 1477, succeeding him at his printing office (1491). He lived in Fleet Street, London, from 1502, and died about 1535. He made improvements in the art of printing, especially in type-cutting, his works (over 400 in number) being distinguished by elegance and neatness. See E. G. Duff, *Printers, Stationers, and Bookbinders of Westminster and London, 1476-1535* (1906).

Wordsworth, Charles (1806-92), an English divine, nephew of the poet, educated at Harrow and Oxford. As tutor at Oxford he had Manning and Gladstone among his pupils. W. was second master at Winchester (1835-46), warden of Glenalmond Episcopal College (1846-54), and bishop of St. Andrews (1852). His works include *Public Appeals on Behalf of Christian Unity*, 1886; *Shakespeare's Historical Plays*, 1883. See his *Annals of My Early Life, 1806-46*, 1891; *Annals of My Life, 1847-56*, 1893 (edited by Hodgson); John Wordsworth, *Episcopate of Charles Wordsworth*, 1899.

Wordsworth, Christopher (1774-1846), an English scholar and divine, youngest brother of the poet, educated at Cambridge, becoming a fellow of Trinity (1798), and master (1820-41). He held livings successively in Norfolk (1804), Essex (1808), Surrey, Kent (1815), and Sussex (1820). His works include: *Ecclesiastical Biography* (1810, 1839); *Christian Institutes*, 1836 (selections from English divines); *Who wrote Icon Basiliké?* 1824.

Wordsworth, Christopher (1807-85), an English divine and writer, youngest son of above, educated at Winchester and Cambridge. He was headmaster at Harrow (1836-44), canon of Westminster (1844), held a living in Berkshire (1850-60), and became bishop of Lincoln (1868). Among his works are: the Bible commentary, *Greek New Testament*, 1856-60; *Old Testament*, 1864-70; *Church History up to 451 A.D.*, 1881-83; *Memorials of William Wordsworth*, 1851. In 1873-75 occurred his controversy with the Wesleys, and 'the great Coates case.' See *Life* by J. H. Overton and E. Wordsworth (1888).

Wordsworth, Dorothy (1771-1855), an English writer, only sister of the poet. From 1795 she kept house for her brother, accompanying him and Coleridge to Germany (1798-99). She later settled with Wordsworth and

his wife at Grasmere, whence they moved to Rydal Mount (1813). The poet acknowledged in beautiful lines how much he owed to her inspiring companionship, and dedicated to her the *Evening Walk* (1793). Her *Recollections of a Tour in Scotland* (1803) was edited by Shairpe and her *Journals* by Knight (1897). She never fully recovered from an attack of brain-fever (1832). A *Life of Dorothy Wordsworth* by Edmund Lee was published in 1886. See also C. M. McLean, *Dorothy and William Wordsworth*, 1927.

Wordsworth, William (1770-1850), Eng. poet, was the son of John W., attorney of Cocker-mouth, Cumberland, at which place the author was born. He was sent in 1778 to the grammar school at Hawkshead, and in 1787 went to St. John's College, Cambridge. In that year he published in the *European Magazine* his first poem. In the summer vacation of 1790 he made a walking tour through France and Switzerland, and in Nov. 1791, returned to France to study, spending several months in Orleans and Blois. It was during this time that he formed a liaison with a French woman, and by her had the daughter who is probably addressed in the celebrated sonnet beginning 'It is a beauteous evening, calm and free. He had now become an enthusiastic supporter of the Fr. revolution, and was only dissuaded by the interposition of friends from joining the Girondins and probably sharing their fate. The collapse of his early Utopian faith was followed by a period of great mental disturbance but he was won back by the influence of his sister Dorothy. Returning to England he published, in 1793, the *Evening Walk*, on the landscape round Ambleside and Hawkshead, and the *Descriptive Sketches*, the materials of which were supplied by continental acquaintances. These two poems are in the classic couplet and in the poetic style then in vogue, but the copious detail in description takes them out of the ordinary category of eighteenth-century landscape poetry. Two years later he made the acquaintance of Coleridge, and the men, who recognised each other's genius, cemented a firm friendship; and through Coleridge he became acquainted with Charles Lamb and Hazlitt. A legacy of £900 in 1795 made him independent and induced him to devote himself to literature. He then went to live in Alfoxden, Somerset, and it was there that he formed his friendship with Coleridge. In 1798 the friends published a joint volume of verse, styled *Lyrical Ballads*, which, although epoch-making in Eng. literature,

attracted little favourable attention at the time. W.'s *Preface* to the *Lyrical Ballads* embodies his theory of poetry. In the same year W., with his sister Dorothy and Coleridge, went to Germany, and the brother and sister lived at Goslar, in the Harz district, and led a quiet, unsociable life. They returned to England the next year and settled at Grasmere, which was W.'s home till 1813, when he removed to Rydal Mount. He had married Mary Hutchinson in 1802, and thereafter for many years continued to write and publish poetry—undeterred by an indifferent public and scornful critics. He published various poems in 1807, and in 1814 printed *The Excursion*. *Peter Bell* and *The Waggoner* appeared five years later. About 1813 W. was given the sinecure of distributor of stamps for the county of Westmorland, which he held until 1842, when, on his retirement, he was granted a Civil List pension. In 1843 he accepted the poet-laureateship in succession to Southey, and his *Ode on the Installation of Prince Albert as Chancellor of the University of Cambridge* was one of the tasks done in his official position. He died March 23, 1850. Among his other works are: *Ecclesiastical Sketches*, 1822, and *Yarrow Revisited*, and other poems, 1835. *The Prelude, or Growth of a Poet's Mind* was issued posthumously in 1850. W. is principally distinguished for his love of nature, and for the simplicity of his style. His leanings towards simplicity and his dread of being artificial in the expression of his feelings sometimes led him, however, into excesses. At his best, however, he had a magnificent gift of language, and the music of his verse is delicious. W. was of austere mould, somewhat unyielding and lacking in humour, and obviously conscious of his talents and mission. His life in the Lake District, remote from the cities, tended to narrow his outlook, and his solitary habits, combined with the flattery of a close band of worshippers, tended to enhance his egotism. Yet this very isolation was part of his greatness and to the end he remained sincere and utterly indifferent to material gain. Early in life he meant to become a poet of Nature in an original sense and his triumph in that kind was complete. His Nature poetry is faithful in its every detail, yet is still more distinctive for its really more characteristic feature—its religious quality in interpretation. If an unequal writer with some obvious limitations, he often reveals supreme beauty, dignity and force, and his place in

the hierarchy of Eng. poets is secure.

Consult *Poetical Works*, ed. Knight (with memoir), 11 vols., 1882-89; ed. Dowden (with memoir), 7 vols., 1892-93; ed. N. C. Smith, 3 vols., 1908; *Prose Works*, ed. Grosart, 3 vols., 1876; *The Prelude*, ed. E. de Selincourt (both versions), 1926. (*Biographical*) W. A. Knight, *Life of Wordsworth*, 1889; E. Legouis, *La Jeunesse de Wordsworth*, 1896 (Eng. trans. 1897); G. M. Harper, *William Wordsworth, His Life, Works, and Influence*, 1916, new ed. 1929; see also biographical and critical studies by F. W. H. Myers (1881), W. Raleigh (1903), H. W. Garrod (1927), C. H. Herford (1930), H. Read (1930).

Work, in mechanics and engineering, is the effect produced in any mass by a force acting against inertia or resistance. The effect may result in strain merely or produce motion of the mass; in all actual cases the whole W. possible is distributed, only a portion of it becoming *useful*, a great deal being expended in overcoming friction, or as, in the case of steam and electricity, 'leaking' owing to the impossibility of controlling the direction of the force. In mechanical W. a foot-pound is the unit. Thus if a body of 2 lb. weight changes its level by 5 ft., the W. given out in falling, or received on rising, is 10 foot-pounds, neglecting friction, etc. The W. is measured as the product of resistance and the distance over which it is overcome. This is so whether the motion is direct, inclined, or curved. If in the case of a force of p lb. exerting a pull, the pull be not direct but inclined at an angle of θ to the resultant motion, the effective force is $p \cos \theta$. *Power* takes account of time; it is the time rate of doing W. One horse-power is the W. of 33,000 foot-pounds done in one minute. *Energy* is the capability of doing W. It is useful to note that the energy of 1 lb. of coal being 12,000,000 foot-pounds, only about 4 per cent. is communicated to the shaft through the piston, 96 per cent. being lost. The very best steam engines use more than 1.5 lb. of coal per hour for each horse-power given out; engines using Dowson gas consume similarly 1 lb. of coal; oil-engines, 0.9 lb. kerosene. The metric unit of W. is the kilogram-metre; in the C.G.S. system, the unit is the degree-centimetre or 1 *erg*. One joule (*q.v.*) = 10,000,000 ergs = 0.7373 foot-pound; 1 *erg* = 13.563,000 ergs about. *Resilience* is the W. done on a bar in producing stress, or the W. the bar will do in regaining shape when relieved from stress. In the case of an *expanding gas*, when p = pressure and

v = volume, $p = \frac{dW}{dv}$ when W is the work done. If expansion is according to the law $pv^s = c$, a constant, then $\frac{dW}{dv} = Cv^{-s}$; $W = C + v^{-s+1} \times C / -s + 1$; $C = v_1^{-s} \times C / 1 - s$, whence $W = (v^{-s} - v_1^{-s})C / 1 - s$ is expansion from v_1 to v .

Workhouse, see POOR LAWS.

Working Men's Club and Institute Union comprised in 1932 2685 workmen's self-governed, self-supporting clubs and owes its beginning in 1862 to the late Rev. Henry Solly. It is a non-political body and, while welcoming all *bona-fide* clubs within its ranks, it closely scrutinises the character of any club which seeks membership, and, as a rough average, only about one-half the clubs applying are accepted. Clubs must register under either the Friendly or the Industrial and Provident Societies Acts. These Acts require annual returns with audited balance-sheets to be made to the Registrar of Friendly Societies, and the club officers are advised by the Union regarding book-keeping and forms of account, also in legal matters, and the interests of affiliated clubs are protected by advice and influence. The Union is closely linked with the Workers' Educational Association, and it has established convalescent homes for the benefit of its members.

Workington, a municipal bor., seaport and market tn. of Cumberland, England, 34 m. from Carlisle, on the Derwent. Its industries include coal mining, iron smelting, engineering, and shipbuilding. Pop. (1931) 24,690.

Workmen's Compensation. The principle underlying the Workmen's Compensation Acts is that of compulsory insurance of workmen by the employer. A liability to pay compensation attaches to the relationship of employer and workman and it is a statutory liability irrespective of negligence either on his part or on that of his servants to make pecuniary compensation for death or disability happening to a workman in the course of his employment. This principle was introduced into Eng. law by the Workmen's Compensation Act of 1897, prior to which Act the remedies available to the injured workman were either an action at common law or an action under the Employers' Liability Act, 1880. At common law the employer is bound to take reasonable care that his workmen shall not suffer injury from his (the employer's) personal negligence or neglect of any statutory duty. But if the workman has been guilty of contributory negligence and

sustained injury thereby, there is no liability at common law on the employer. Further, if the workman, realising the risk of injury incident to his work, voluntarily agrees to incur the risk, the maxim *volenti non fit injuria* (to the consenting no injury is done) applies. Again, as an extension of the principle involved in this maxim, the doctrine of 'common employment' availed to defeat the workman, i.e. the doctrine by virtue of which a servant or employee was unable to obtain damages from a master or employer for injury sustained as a result of the negligence of a fellow-servant. The reason for the doctrine was that the injured servant was (as indicated above) assumed to have undertaken to run all the risks attendant on his service, including that of the negligence of a servant of him who was the common employer or master of both. The Act of 1880 practically disposed of the doctrine of 'common employment.' It put a workman in practically the same position as a stranger as respects the safe and fit condition of the machinery or other material instruments of his employer's business, and gave him compensation for injury arising from the negligence of another servant exercising superintendence, or carrying out specific orders.

Employers' Liability Act, 1880, enables a workman to recover for personal injury sustained as a consequence of (1) defect in the works, machinery, plant, or condition of the ways connected with the business of his employer, but not unless such defect arose from or was not remedied owing to the negligence of the employer or some employee entrusted with the charge of the works, ways, etc.; (2) the negligence of (a) a fellow-servant whose orders he was bound to obey and did obey when injured, (b) an employee exercising superintendence, (c) any employee who has the charge or control of any signal points or locomotive engine or train upon a railway, and (3) the act or omission of an employee done or made in obedience to the rules or by-laws of the employer or the instructions of a person in delegated authority. But the workman cannot recover compensation if, knowing of the defect or negligence, he failed within a reasonable time to give information about it either to his employer or some superior servant; nor can he recover if he has contracted himself out of the benefits of the Act, and contributory negligence on his part is a complete defence. The limit of compensation under this Act is a sum equivalent to the earnings of the injured workman during the three

years prior to injury. No action can be brought unless (1) written notice of the injury was given by the workman within six weeks; and (2) the action is begun within six months of the accident causing the injury. These rules are relaxed where death has resulted, the representatives having twelve months in which to take proceedings, while the absence of the notice may be excused for good reason shown. Domestic or menial servants, omnibus conductors, drivers of trams, grocers' assistants, and portmen are by the operation of various decisions and the definition of a workman adopted in the Act from that of the Employers and Workmen Act, 1875, excluded from the benefit of the Act. The Act applies to Scotland.

Workmen's Compensation Act, 1897.—This Act marked a great advance in the social obligations of masters and employers, and made them in effect insurers of their employees against accidents. Gone were the necessity for proving negligence and the embarrassing technicalities of procedure. The Act provided that a workman might recover compensation for personal injury caused by an accident 'arising out of and in the course of employment.' But it restricted the right to get compensation exclusively for injuries sustained in one or other of a list of notoriously dangerous occupations, and a further defect was that it did not apply to injuries to health caused by employment in noxious industries or, in other words, 'industrial diseases.' The Act also introduced the practice of settlement of liability by arbitration proceedings, but left untouched the existing rights of action at common law and under the Employers' Liability Act, 1880.

Workmen's Compensation Acts, 1900 to 1923.—The Act of 1900 extended the scope of the Act of 1897 to employment in agriculture, but all the earlier Workmen's Compensation Acts were repealed by the Act of 1906, which re-enacted their principles while omitting most of the above-mentioned limitations and exceptions. It gave the right to obtain compensation to all persons in regular employment (except soldiers, sailors, and policemen) whose remuneration was not over £250 a year. It also introduced the principle of including under the notion of 'accident' certain industrial diseases, and gave a workman a right to compensation for disablement due to such diseases as were enumerated in the Act. The list included, *inter alia*, anthrax, lead, phosphorus, mercury, and arsenic poisoning, and ankylostomiasis, to which others were subsequently added by Order in Council, including

glanders, poisoning by nitrous fumes and telegraphists' cramp. The only defence left to the employer was where he could prove that the accident was due to the 'serious and wilful misconduct of the workman'—words which have given rise to a great number of decisions which are sometimes difficult to reconcile with each other. The Act of 1923 repealed two Acts passed during the Great War period whereby certain temporary increases in the rate of compensation for total incapacity had been made, while retaining additions payable in respect of accidents which had happened before 1923. It also considerably amplified the definition of 'workman' given in the Act of 1906 by including certain accidents happening when the workman was acting contrary to regulations.

The Workmen's Compensation Act, 1925.—This Act consolidates the law and applies to all cases where the accident happened on or after Jan. 1, 1924. It repeals all the previous W. C. Acts, except a few sections of the Act of 1923. The chief provisions may be treated under the following heads:—

Right to Compensation.—The Act gives the right to compensation for injury by accident 'arising out of and in the course of employment,' provided the injury disables the workman for a period of at least three days from earning full wages and provided the injury is not attributable to the serious and wilful misconduct of the workman. For the numerous decisions that have been given under this and the older Acts on the words 'out of and in the course of employment' reference should be made to *The English and Empire Digest*; but, generally speaking, it may be said that 'arising out of the employment' means 'arising out of the work which the man is employed to do and what is incident to it; in other words, out of his service' (*per* Lord Finlay in *Davidson v. McRobb*, 1918), and imports 'some kind of causal relation with the employment, but does not logically necessitate direct or physical causation' (*per* Lord Haldane in *Upton v. Great Central Railway Company*, 1924); while 'in the course of his employment does not mean during the currency of the employment, but in the course of the work which he is employed to do and what is incident to it; and absence on leave for the workman's own purpose is an interruption of the employment' (*Lord Finlay*). Even though the workman was at the time of the accident acting in contravention of any regulation applicable to his em-

ployment or was acting without instructions from his employer, the workman and, in the event of death, his personal representatives are none the less entitled to compensation if the act which resulted in the accident was done by the workman for the purposes of and in connection with his employer's trade or business.

Persons Entitled to Compensation.—The compensation is payable to or for the benefit of the workman, but, when death results from the injury, to or for the benefit of his dependants. When there are both total and partial dependants, compensation may be allotted partly to the total and partly to the partial dependants. The expression 'workman' includes any person who has entered into or works under a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work or otherwise; and also a person engaged in plying for hire any vehicle or vessel which he has obtained from the owner of the vehicle under a contract of bailment (but not under a hire-purchase agreement) in consideration of a fixed sum or a share of the earnings. But the following persons are not 'workmen' within the Act: non-manual employees receiving more than £350 a year; casual employees employed otherwise than for the purpose of the employer's trade or business and not being persons employed by a club for the purposes of any game or recreation; members of the police force; outworkers; and members of the employer's family dwelling in his house. 'Employer' includes any body of persons incorporated or unincorporated and the legal personal representatives of the employer; and also where an employer lends the services of an employee temporarily to another employer he none the less remains liable to pay compensation for an injury occurring to the workman during his temporary service. If an employer contracts with others for the execution of work, he, as principal, remains liable to pay any compensation he would have had to pay if the workman had been immediately employed by him.

Amount of Compensation.—(a) In fatal cases the amount of compensation is a lump sum with an additional sum or 'children's allowance' for the dependants, such lump sum and addition not to exceed £600. Where there are dependants the lump sum is a sum equal to the workman's earnings from the same employer during the three preceding years, or £200, whichever be greater, but in no case more than £300; if the period of employment was less than three

years, the amount of his earnings in the previous three years is taken to be 156 times his average weekly earnings; and from the lump sum is deducted the amount of any weekly payments made before death, but not so as to reduce the lump sum below £200. If there are no dependants wholly dependent on his earnings the lump sum may be settled by arbitration, and if there are no dependants at all the sum is an amount covering reasonable medical and funeral expenses, not exceeding £15. 'Children's allowance' in respect of each child is a sum equal to 15 per cent. of the average weekly earnings multiplied by the number of weeks between the death of the workman and the date when the child attains fifteen years of age; or, if the widow or children were only partially dependent, then a proportionate part of such allowance. (b) In cases of total or partial incapacity, the compensation is a weekly payment in no case over thirty shillings; but if the incapacity lasts less than four weeks no compensation is paid in respect of the first three days and a deduction may be made in respect of any payment or benefit the workman may have received during incapacity. In the case of total incapacity the weekly payment is a sum not exceeding 50 per cent. of the average weekly earnings in the previous twelve months or the same percentage of his average for any less period; but if the maximum weekly payment so calculated is less than twenty-five shillings a weekly addition is made equal to half the difference between this maximum and twenty-five shillings, whichever be less. In the case of partial incapacity the weekly payment is half the difference between the weekly earnings before and after the accident or, where the weekly payment would (on the assumption of total incapacity) have amounted to less than twenty-five shillings, then a proportionate part of the sum calculated as above. Where the workman has so far recovered as to be fit for some kind of employment, but owing to his injury cannot obtain work in spite of his taking all reasonable steps to do so, a co. court judge may order that his incapacity shall continue to be treated as total for such time as he thinks fit, subject to review. The Act provides for reviews of weekly payments at the request either of the employer or the workman and for settlement by arbitration in default of agreement. The employer may redeem the weekly payments after six months or more by a lump sum equivalent to an annuity of 75 per cent. of the annual

value of the weekly payment or, where the incapacity is not permanent, by a sum settled by arbitration. Proceedings to recover compensation will not be entertained unless notice of the accident has been given as soon as practicable and before the workman has voluntarily left the employment in which he was injured, and the claim must be made within six months from the accident or, in the case of death, six months from death. There are special provisions as to keeping conspicuously posted up in mines or factories a summary of the requirements of the Act in regard to giving notice of accidents and making claims. There are also provisions for periodical medical examination; and for registration of agreements and awards so as to render them enforceable in a co. court. The Act contains an important saving clause providing that if the injury was due to the personal negligence or wilful act of the employer (or of some person for whose acts he is responsible) nothing in the Act affects any civil liability of the employer, but the workman may, at his option, claim compensation under the Act, or take proceedings independently of the Act. The employer is not, however, liable to pay compensation both independently and also under the Act, nor is he liable to any proceedings independently of the Act except in case of such personal negligence or wilful act. The Act allows the substitution for its provisions of schemes approved by the Registrar of Friendly Societies, but such substituted schemes must not be less favourable to the workman than the provisions of the Act.

Industrial Diseases.—As regards the application of the Act to industrial diseases, compensation is only recoverable where the disease is one of those included in Schedule II. (anthrax, lead, mercury, phosphorus, and arsenic poisoning; and ankylos-tomiasis). The workman must obtain from the surgeon appointed under the Factory and Workshop Acts a certificate of his disablement (in the case of death his personal representative obtains the certificate) or suspension from his usual employment through disease due to the nature of his employment at any time within the previous twelve months. If, however, it is proved that the workman at the time of entering the employment wilfully and falsely represented himself in writing as not having previously suffered from the disease, no compensation is payable. The amount of compensation is calculated with reference to the earnings of the workman under

the employer from whom the compensation is recoverable, and the employer to whom notice of the death, disablement, or suspension is to be given is the employer who last employed the workman during the previous twelve months in the work to the nature of which the disease was due; and the notice may be given notwithstanding that the workman has voluntarily left his employment.

The W. C. Acts have no application outside the United Kingdom, except as to persons employed on ships and aircraft. But reciprocal conventions have already been made with France and Denmark regarding Eng. workmen employed in those countries and workmen of those nationalities employed in the United Kingdom.

Consult Halsbury's Laws of England; Willis's Workmen's Compensation Acts; Elliott on Workmen's Compensation, 9th ed., by Montague Berryman, 1926.

Works and Public Buildings, Board of, see BOARD.

Workshops Acts, see FACTORY LEGISLATION.

Workshop, a market tn. of Nottinghamshire, England, on the Ryton. Its parish church, which formerly belonged to an Augustinian priory, is a fine old cruciform edifice. Malting is the chief industry, but there are chemical works and an important cattle market. Pop. (1931) 26,285.

World War, see WAR, THE GREAT.

Worm, see SCREW-NAILS.

Worm Grass, or **Pink Root** (*Spigelia marilandica*). The roots have antelmintic properties.

Worms, a city of Germany, on the Rhine, formerly in Hesse-Darmstadt, now in the republic of Hesse. Its notable building is the Romanesque cathedral of SS. Peter and Paul, dating from the twelfth century, but there is also the church of Our Lady, a handsome Gothic edifice outside the tn., finished in 1467, the church of St. Paul (1102-1116) which is now converted into a museum of antiquities, the Luther monument (1868) designed by Rietschel, the hospital, and the tn. hall. The Bischofshof, in which the Ger. diets met, is now replaced by a modern edifice. The tn. is one of the oldest in the Reich, and in the time of Ariovistus was a Ger. chief's residence. It was fortified by Drusus in 14 B.C., and in the fifth century was the capital of the Burgundians. As early as 1074 it was a free imperial city, and is now a busy riv. port with important industries and trade. The manufs. include leather, machinery, wool, cloth, chicory, and slates, while many of

the inhabitants are employed in the cultivation of the vine, the most famous wine being known as Liebfrauenmilch. W. is the scene of stirring events related in *Das Nibelungenlied*. Pop. (1925) 47,015.

Worms, see ANTHELMINTICS, PARASITES.

Wormwood (*Artemisia absinthium*), a tall perennial plant (order Compositæ) with silky stems and leaves and numerous small yellow flower heads. It is one of the chief ingredients from which absinthe is derived, and is used as a tonic.

Worsted, see WOOL.

Wörth, a vil. of Alsace, France, on the Sauer, famous as the scene of the battle fought in 1870 between the Gers. and the Fr., which resulted in a victory for the former under the Crown Prince of Prussia. Pop. 2000.

Worthing, a mun. bor. and seaside resort on the Eng. Channel, Sussex, Eng. In the vicinity is Broadwater Church, a fine example of mingled Saxon and Norman ornamental architecture. Pop. (1931) 46,230.

Wotton, Sir Henry (1568-1639), an Eng. diplomatist and poet, b. in Kent. He was secretary to the Earl of Essex during Elizabeth's reign, and under James I. was for twenty years in the diplomatic service. In 1624 he was made provost of Eton. Izaak Walton's *Life of Wotton* was prefixed to the *Reliquiæ Wottonianæ* (1651). See also Logan Pearsall Smith, *Life and Letters of Wotton*, 2 vols., 1907.

Wounds, the rupture of the soft structures of the body. They are usually classified as incised, punctured, contused, and lacerated. An incised W. is a clean cut, such as is made by a knife. The blood-vessels being cut clean, they bleed more freely than other kinds. The opening tends to gape on account of the retraction of the superficial structures. When the edges of such a W. are kept closed together, healing generally proceeds by 'first intention,' that is, the two surfaces soon become united by a film of lymph, which develops into connective tissue. Punctured Ws. are those produced by the thrust of a pointed instrument. They are dangerous according to their depth; a deep-seated organ may be injured or the instrument may have carried in septic germs. There is frequently little bleeding apparent, though there may be dangerous internal hæmorrhage. Contused Ws. are caused by blunt instruments, or by falls. There is usually very little bleeding, though the parts may be extensively bruised. Owing to the injury to the small blood-vessels, healing may be protracted. Lacerated Ws. are pro-

duced by injuries from machinery, the teeth and claws of animals, etc. They are dangerous when extensive, as there is considerable danger of infection by germs. Healing is usually by 'second intention'; a film of lymph forms over the W. and granulations form. A scar ultimately takes the place of the destroyed skin. If tissue has been much destroyed, extensive sloughing may take place. In treating Ws. it is necessary first to arrest the bleeding and then close the W. Where there is danger of septic infection, however, the W. should be cleaned and dressed with antiseptics.

Wouwerman, Philip (1620-68), a Dutch painter, was b. at Haarlem. Having studied under his father, Paul Wouwerman, and John Wynaens, he pursued his art in his native tn. with apparently little success, although his landscapes and hunting scenes are now very much appreciated for their breadth and animation of treatment.

Wrangel, Carl Gustav (1613-76), a famous Swedish soldier. He became a major-general of infantry at the age of twenty-four, and distinguished himself at the battles of Wolfenbüttel (1641) and Leipzig (1642). He commanded the Swedish fleet against the Danes in 1644-45 and in 1646 succeeded Forstenberg as commander-in-chief of the Swedish army in Germany, playing a prominent part in the later stages of the Thirty Years' War. He subsequently became a member of the Council of Regency, but failed as an administrator.

Wrangel, Friedrich Heinrich Ernst, Count (1784-1877), Prussian Field-Marshal; b. April 13, at Stettin. Entered army, 1796; fought against Napoleon; colonel, 1815. Major-general, 1823. Lieutenant-general, 1838. Commanded, 1848, second army corps of Federal troops in Schleswig-Holstein campaign; same year suppressed rising in Berlin, and made general of cavalry. Field-Marshal, 1856. Commanded Austro-Prussian force against Denmark, 1864; but retired early in campaign and was made Count. Took part in war of 1866. Died in Berlin, Nov. 1.

Wrangel, Peter Nikolaievitch (1878-1928), Russian general, b. Petrograd. He served through the Russo-Japanese War and the Great War, mainly with the Cossacks. After the War he joined Kaledin (q.v.), who was head of an anti-Bolshevik republic of the Don Cossacks. Kaledin committed suicide in 1918, and W. joined Denikin's (q.v.) army. Denikin, however, was defeated by the Bolsheviks in 1920, and he resigned, leaving W. in sole command of his disorganised army. Supported by the Fr. W. continued successfully

to withstand the Bolsheviks until after they ended the war with Poland. W. was then compelled to evacuate the Crimea. He *d.* in Brussels.

Wrangel Land, New Columbia, or Long's Island, an island in the Arctic Ocean off the N.E. coast of Siberia. It was discovered by Long, although Wrangel made an expedition in search of it. It consists mainly of bare rocks which rise to a height of 2000 ft.

Wrangler, the term applied in the University of Cambridge, England, to those who have attained first-class honours in Part II of the mathematical tripos, i.e. the final examination for honours in pure and applied mathematics. The one who took the first place in Class I was, until 1912, called *Senior Wrangler*. Those in the second class are designated *Senior Optimes*, and those in the third *Junior Optimes*. An obsolete meaning of the verb, *wrangle*, meant to give a public disputation.

Wrasse, in ichthyology, any species of the genus *Labrus*. The general form of the body is like that of the perch (*q.v.*), but the back is straighter. There is a single long dorsal, and the ventrals are under the pectorals. Coloration generally very brilliant. The flesh is of little food value. W. frequent rocky shores, usually in small shoals, and often concealed in seaweed. Two species are British—the Ballan W. and the Red W. Also known as rock fish.

Wrath, Cape, see CAPE WRATH.

Wray, John, see RAY (or WRAY), JOHN.

Wrecks. The law on W. is contained in the Merchant Shipping Act of 1894 so far as territorial waters are concerned. In earlier times flotsam, floating wreck; jetsam, property thrown overboard to avoid wreck; ligan, property sunk and marked with buoys for purposes of recovery; derelict, or totally abandoned property, were distinguished from wreckage cast on the shore, and were claimed by the Admiralty on behalf of the crown. These are all now included in the one general term. Local receivers are appointed by the Board of Trade, which has taken over the powers of the Admiralty, and it is the business of the receiver to take charge of any wreckage found or brought in (except in the case of that brought from extra-territorial waters by a foreign ship). It is the duty of all persons finding wreckage to notify the receiver, who must proceed to the place and take complete charge, not merely of property but of all means of recovery, including the work of persons near, vehicles, means of approach, and so on, as also of public order; he also must notify the

nearest customs-house, and, if the value is over £20, Lloyds. In cases where the right to wreckage has been granted by the crown to lords of the manor, or other persons, they also must be notified. The duties of the receiver, if he be absent, devolve on the chief customs officer, first; then on the chief officer of the coastguard, inland revenue officer, sheriff, justice of the peace, or officer of the navy or army on full pay. The wreckage, being received, is finally sold, unless claimed within a year by the owner, the proceeds being paid over to the crown or other person having the right, after the salvage claims and expenses have been deducted. These also must be paid before recovery by the owner, if his claim has been established. In any case, also, duty is levied on goods so recovered as if they had been imported in the ordinary way. The receiver's duties also extend to cases of ships in distress and any services rendered; he, or a wreck commissioner appointed by the Lord Chancellor, holds a court of inquiry. When W. occur in navigable water-ways or harbours, the authorities responsible for the safety of such places have power to remove them, and claim expenses from the owners or underwriters if they have entered into possession. The statutory power given to harbour or conservancy authorities to remove or destroy any vessel sunk, stranded, or abandoned in any harbour or tidal water under their control and to sell the wreckage so as to reimburse themselves for the expense does not extend to his Majesty's vessels (*Christie v. Trinity House*, 1919). The term wreck applies only to tidal waters and to vessels and their contents; in the U.S.A. it applies also to inland lakes and the large rivers. In proportion as ships have become larger and have discarded sails, the number of W. has largely diminished; storm warnings have added to the safety of vessels largely. On the other hand, the value of W. is generally larger and salvage may be very remunerative; companies and firms have established themselves for the sole purpose of salvage. The law relating to W. and salvage and to the duty of rendering assistance to vessels applies to aircraft on or over the sea or tidal waters in the same way as it applies to vessels, and, for this purpose, the law includes the Merchant Shipping Acts and other Acts covering the same subjects. The owner of an aircraft is entitled to a reasonable reward for salvage services rendered by the aircraft to any property or persons in any case where the owner of a ship would be so entitled (the

Air Navigation Act, 1920). The employment of divers may be the means adopted to recover valuable property, or the ship may be bodily raised by ropes and chains worked from pontoons moored around. Divers are used for making the sunken ship water-tight, when it may be pumped out and rise. Another method adopted is to attach large iron cylinders, or caissons, which are sunk by means of water, and lift the W. when they are pumped out. Salvage operations have even extended to anct. W. of treasure ships. In the past twenty years, so far as British W. are concerned, there were most losses of life at sea in the years 1912 and 1914. In 1912 a total of 2335, including 673 of the crew and 825 passengers on the *Titanic* (q.v.); in 1914 a total of 1778, including 171 of the crew and 840 passengers on the *Empress of Ireland* (losses by hostile action in the Great War are not included). In 1928 the total was under 300; and in 1929 131 lives were lost. In 1930 the total losses of the world's mercantile marine were about 400 vessels, aggregating over 400,000 tons, as against 500 in 1929, aggregating 600,000 tons.

Consult Board of Trade, *Instructions as to Wreck and Salvage*, for salvage operations. See also SALVAGE.

Wrekin, see SHROPSHIRE.

Wren (*Troglodytes parvulus*), a common bird ranging throughout Europe, Northern Africa, and Asia. It is about 4 in. long and has short rounded wings, and usually carries its tail over the back. Its plumage is rich reddish brown, it builds a large domed nest, and additional nests are often built close at hand. Its song is remarkably loud. It feeds almost entirely on insects, and therefore deserves the protection which it has long shared with the robin. The gold crested W. (*Regulus cristatus*) belongs to the warbler family (*Sylviidae*).

Wren, Sir Christopher (1632-1723), celebrated Eng. architect, b. at East Knoyle, Wilts. At the age of fourteen he was sent to Wadham College, Oxford, and at twenty-one was elected Fellow of All Souls. As a young man he was interested in astronomy, and in 1657 he was appointed professor of astronomy at Gresham College, London, but a few years later Savilian Professor of Astronomy, Oxford. He was about thirty when he devoted himself seriously to the profession by which he became famous. After serving as assistant to Sir John Denham, the surveyor-general, he was appointed his successor in 1661, in which year he was made a doctor of civil law. The tale of his buildings is very lengthy, and includes the chapels of

Pembroke and Emmanuel Colleges, Cambridge; the Sheldonian Theatre, Oxford; St. Paul's Cathedral, London; and also the London churches of St. Sepulchre's, Newgate; St. Michael's, Cornhill; St. Stephen's, Walbrook; St. Bride's, Fleet Street; St. Clement's, Eastcheap; and other city churches; the Royal Exchange, London (destroyed by fire in 1838); Custom House, London; the Monument, London; Temple Bar; buildings at Christ's Hospital, Newgate Street—now destroyed; the towers of the west front of Westminster Abbey; Royal Observatory, Greenwich; Chelsea Hospital; Marlborough House; Windsor Palace and additions to Hampton Court. After the Great Fire of 1666, he was made surveyor-general and principal architect for rebuilding the whole city. He proposed a plan for laying out London, but the plan was not adopted. After 1668 his services were so extensively employed that he had to resign his professorship in 1673. In 1674 he was knighted; in 1680 he was chosen President of the Royal Society, of which he was one of the original members. He was a many-sided man, and his energy was prodigious. He is the greatest British architect of modern times. His masterpiece, the present edifice of St. Paul's, was built, curiously enough, not from his first and favourite design, a model of which is in the Cathedral, but from a second one. It was begun in 1675, and divine service was first celebrated in the choir in 1697; the last part of the lantern was laid by his son (see also ST. PAUL'S CATHEDRAL). He d. at East Knoyle, Feb. 26, and was buried in St. Paul's Cathedral.

See *Parentalia* or *Memoirs of the Wrens*, by his son, 1750; also L. Phillimore, *Wren, his Family and Times*, 1881; L. Weaver, *Sir Christopher Wren*, 1923, and the W. Soc. publications.

Wrestling, one of the athletic exercises of almost every nation, was in use among the Gks. from the earliest times, and in Homer's *Iliad* (xxiii. 700 ff.) we have a fine description of an early contest. The Gk. W. contest was divided into two parts: (1) the struggle to throw your opponent; (2) the struggle on the ground. At first the wrestlers wore a girdle, but in later times they wrestled naked. The body was previously rubbed with oil to make the skin supple and to check perspiration, and was then sprinkled with sand to give a grip. The loser had to be thrown three times before he was vanquished. The Rom. W. was an imitation of the later forms of Gk. W. Neither of these must be confused with the modern Greco-Rom. style, which is

of comparatively recent invention. Throughout the Middle Ages, W. was a favourite sport in England among the common people, and the Londoners were distinguished for their skill (Matthew Paris, *Hist. Angl.* anno 1222). It has now almost died out except as a professional sport. There are two distinct Eng. games, however, which still continue in use, the rules of which are used in amateur contests. In the *Cornwall* or *Cornwall and Devon Game*, the wrestlers wear a short, strong jacket, and the preliminary hold is made by a catch. Originally, heavy shoes were worn and the play often became very rough, though not so rough as in Lancashire. Two shoulders and one hip, or two hips and one shoulder must touch the ground before a wrestler is vanquished. The *Cumberland* or *Cumberland and Westmorland* W. is the cleanest and simplest of games, and is distinguished by the fact that there is no ground play. The preliminary hold is deliberate, each wrestler passing his left arm over the right shoulder of his opponent, the right arm under the left arm, and grasping the wrist behind the back. The wrestler who first touches the ground loses the match. The Japanese style of W., known as Jiu-jitsu, does not bear the slightest resemblance to the types dealt with above. It is not a trial of strength, and it is not a sport. It is a method of self-defence for long handed down secretly, and based on a very accurate knowledge of anatomy. Since the time of Frank Gotch, almost the first of the great scientific champions of W., who was defeated by Hackenschmidt in 1908, the following have been acknowledged world's champions:—Mahmont, 1911; Hackenschmidt, 1912; B. F. Roller, 1913; Eddie Lewis, 1915; Munn, 1924; Zbyszko, 1925; Stecher, 1928; Lewis, 1929; Jim London, 1930. See P. Longhurst, *Wrestling*, 1917; G. Hackenschmidt, *Complete Science of Wrestling*, 1929; E. Gruhn, *Test-book of Wrestling*, 1930.

Wrexham, a parl. and municipal bor. and market tn. of Denbighshire, Wales. Its church of St. Giles, built about 1470, is 'one of the seven wonders of Wales.' There are breweries and tanneries. Pop. (1931) 18,567.

Wright, Sir Almroth Edward, British physician; b. Aug. 10, 1861, at Middleton Tyas, Yorks; second son of Rev. Charles H. W. Wright, D.D. Educated: Dublin University; Leipzig; Strassburg; Marburg. Demonstrator of pathology, University of Cambridge, 1887; Sydney, 1889. Professor of pathology, A.M.S., Netley, 1892–1902; professor of ex-

perimental pathology, University of London, since. Knighted, 1906. Member, Indian Plague Commission, 1898–1900. Originator of anti-typhoid inoculation, therapeutic inoculations for bacterial infection, and methods of measuring protective substance in human blood. Consultant physician, Great War; K.B.E. Besides technical books, has written *The Unexpurgated Case Against Woman Suffrage*, 1913.

Wright, Orville, American aviator; b. Aug. 19, 1871, at Dayton, O.; son of Milton W. Educated at a high school. His brother Wilbur (1867–1912) and he made a heavier-than-air machine (on whose general plan all aeroplanes are constructed), and flew in it at Kitty Hawk, N.C., Dec. 17, 1903—first time any person rose from ground in actual flight by mechanical means. Director, Wright Aeronautical Laboratory, Dayton.

Wright, Wilbur (1867–1912), an aeronaut, b. near Millville, Indiana. Being early interested in flying, he began to experiment with his brother about 1900, and three years later accomplished a flight of 260 yds., the first successful experiment of the kind with a motor-propelled aeroplane. In 1905 the two brothers made a record by flying 24½ m. at a speed of 38 m. an hour, and in 1908 Wilbur established his fame by a flight of 56 m. in France. He further increased his reputation by flying 77 m. the same year, being in the air for about 2½ hours. He visited Italy and England, 1909, and also set up a school at Pau, where he trained pupils, but his latter years were mainly spent in America.

Wriothesley, Henry, third Earl of Southampton (1573–1624), Shakespeare's patron, b. near Midhurst. He studied at Cambridge, and at an early age became interested in literature, and from the time he joined the court (about 1590) became known as a patron of poets. To him Shakespeare dedicated his *Venus and Adonis* (1593) and his *Lucrece* (1594), and he was probably on terms of close intimacy with the famous poet. He was the favourite of Elizabeth and Essex, under whom he served in expeditions to Cadiz and Azores. He afterwards participated in Essex's conspiracy, and was imprisoned in the Tower, but was released by James I. (1603). He subsequently took command of a troop of Eng. volunteers in the Netherlands, and d. of fever at Bergen-op-Toom.

Wrist, or Carpus, that portion of the arm between the hand and the lower arm. The joint is made by the articulation of the ulna and radius with the carpal bones. The mobility

of the joint is combined with a great degree of strength, so that dislocations and sprains are not common. Fracture of the lower end of the radius is known as Colles' fracture.

Writ : (1) In the literal sense of that which is written, W. is particularly applied to the Scriptures, or books of the O.T. and N.T., and again, in Scots law, the term is sometimes used to denote a writing, deed, or any legal instrument. (2) In Eng. law, a W. is a precept under seal in the name of some executive officer, such as the Lord Chancellor or a judge, having jurisdiction or authority in the particular matter, and directed to some public officer such as a county sheriff or to some private person, commanding him to do something in relation to a suit or action. In this sense a W. is a legal document which in effect is the first step in legal proceedings, civil or criminal (*see* SUMMONS). Some of the more important of the multifarious Ws. in Eng. law are the W. to the county sheriff to elect a member of parliament, a W. of habeas corpus (*q.v.*), Ws. of mandamus (*q.v.*), prohibition (*q.v.*), and *quo warranto* (*q.v.*), Ws. of *subpoena ad testificandum*, and *subpoena duces tecum*.

Writer's Cramp, see CRAMP.

Writing, the origin of the art of communicating ideas by significant and convenient symbols, is generally traced to the Egyptian ideograms or hieroglyphics through the later hieratic characters (c. 2500 B.C.). But so great is the period that must have elapsed from the time of the conventionalised pictograms of tangible objects or abstract ideas to the time when these actual or symbolical representations had developed into their phonetic values, and again to the time when these phonograms had gone beyond the syllabic to the alphabetic stage, that there is necessarily much conjecture in surmising the course of this evolution (*see* HIEROGLYPHICS). It is impossible to do more than conjecture the period when and where the art of even primitive pictographic W. was established: it is possible that the Egyptian hieroglyphics were derived from some primeval form of Chinese ideographs. However that may be, the excavations of Professor Flinders Petrie in the Egyptian royal tombs at Abydos brought to light inscriptions with hieroglyphics assigned by Egyptologists to 6000 B.C. But there is evidence from clay tablets that alphabetic signs were then already in use; and if this evidence be reliable it is almost useless to attempt to assign anything approaching an exact date to the origin of the Egyptian hieroglyphics. Thompson (*Greek and Latin Palaeography*, 1903)

states that the oldest extant hieroglyphic inscription is that engraved on a tablet, now in the Ashmolean Museum at Oxford, erected to the memory of a priest who lived in the reign of Sent (4000 or 4700 B.C.). But as indicated above, Professor Petrie's discoveries are much older, while clay tablets found at Nippur seem to show that W. was practised in Babylonia as early as 5000 B.C. or even 6000 B.C. Whether the Babylonian cuneiform characters were a development of Egyptian hieroglyphics is doubtful, though the code of Hammurabi (2000 B.C.) does contain a few instances which seem to suggest such evolution. The recovery of the anct. W. of Babylon has ever been complicated by the fact that the W. of the earlier Babylonians, who invented the cuneiform script, was markedly different from the later script of both Nineveh and Babylon in the time of the Sargonids and Nebuchadnezzar (600 B.C.). So far as the authenticity of much that is recorded in the O.T. is concerned, there can be no doubt that the most remarkable and suggestive discovery of modern times was that of the celebrated Tel el-Amarna tablets, comprising hundreds of letters in the cuneiform character, which were excavated from the mounds of Tel el-Amarna, the ruined site of the temporary capital of Egypt at the close of the XVIII. dynasty (c. 1300 B.C.). The philological value of these tablets is that they seem to prove that the language of Canaan was identical with the Hebrew; historically, their value is that they reveal to us the vastness of the Egyptian empire. They were apparently written by kings and governors of Babylonia, Assyria, Phœnicia, and Palestine, and other tributary monarchs of the Pharaohs, and lead to the inference that W. was perfectly developed and in ordinary use for all manner of transactions and among many people of different degrees of social rank. It is possible, too, from the obviously tremendous range of country in which the cuneiform script evidently prevailed, that this script is the source whence the Phœnician or Canaan W. was developed. Each character in cuneiform script represented a syllable, and as in Egyptian (*see* HIEROGLYPHICS) determinatives marked off the meaning of the substantives. There were over 400 syllabic signs, many representing widely different sounds, and many in which the same sound was represented by different characters, all of which features greatly augmented the difficulty of decipherment. The grammatical forms show that the later Babylonian-Assyrian tongue was Semitic. How long this

cuneiform script of the Babylonians endured in Canaan is undecided, though some maintain that it did not cease to be the prevalent form of W. till the time of Hezekiah (700 B.C.). The modern European alphabet is derived directly from the Rom., the latter in its turn from a localised form of the Gk. alphabet, while for years it has been almost axiomatic that the Gk. alphabet was derived from the Phœnicians (see PHŒNICIA), though the origin of the Phœnician or old Semitic alphabet has not been satisfactorily settled. Some derive the Phœnician or Canaan W. from the Assyrian or Babylonian cuneiform script, others variously from the hieratic W. of the Egyptians and the Hittite characters. The Hittite W. was related to the Vannic (or proto-Armenian) cuneiform script and was in all probability of Caucasian origin. The fact that three of the suggested sources of Phœnician are cuneiform scripts of nations each of which in its turn conquered or drove the Phœnicians to the narrow strand of the E. Mediterranean, makes it probable that their W. was originally cuneiform, and such resemblance as it bears to the hieratic W. of the Egyptians strongly suggests that the latter was the source of all the cuneiform scripts. If this be so—and weight is lent to the theory by reason of the semi-hieroglyphic nature of the Old Babylonian cuneiform W.—the progression from old Egyptian hieroglyphics to late Assyrian cuneiform W. through hieratic and old Babylonian W. may be considered as established.

The Hebrews or Israelites borrowed the Phœnician W. when they settled in Canaan. The earliest notable extant record of Hebrew alphabetic W. is that on the Moabite stone discovered at Dibon, 25 m. E. of the Dead Sea, in 1868, and now in the Louvre. It commemorates the victory of Mesha, King of Moab, over Jehoram, King of Israel, and the Edomites, and is believed to belong to 890 B.C. The Siloam inscription, discovered in the wall of the tunnel connecting the Virgin's Fountain with the Pool of Siloam, is also in the more developed cursive style. In 1903 R. A. S. Macalister discovered a calendar inscription in excavations at Gezer, written in the same type as the Siloam and Moabite inscriptions. From these and the rolls of Aramaic papyri discovered in 1904 at Assuan, philologists have been able to construct the whole primitive Phœnician alphabet of twenty-two letters, albeit in a form which had evidently gone through numerous stages of change. Coming to Gk. and Latin W., the most inexpert will readily

note the closest affinities between the Gk. Cadmean and local Gk. alphabets, and the Pelasgian and Latin alphabets on the one hand, and on the other, the Egyptian hieratic and hieroglyphic alphabets. The Gks., as noted above, are reputed to have learned the art of W. from the Phœnicians, and the period commonly assigned to this event is variously the ninth, eighth, or seventh century B.C., while, according to the Cadmean myths, Bœotia was the birthplace of the Gk. alphabet. Like the Semitic W., the earliest Gk. W. was always from right to left, a style which was later followed by that called *boustrophedon*, alternately from right to left and from left to right, as the ox draws the plough. The earliest extant Gk. inscriptions appear to be those incised on the huge figure of Rameses II. at Abu Simbel on the Nile by Gk. mercenaries of the Egyptian army (c. 600 B.C.). Palæographers have long ago learnt from papyrus that the anct. Gks. throughout all known periods as far back as tradition goes employed two kinds of W., the *literary* or *book-hand* for works of literature, and the *cursive* for transactions of everyday life.

There is little need in this article to trace the early history or follow out the development of Latin W. The earliest Latin W. was, as noted above, borrowed directly from local Gk., and the most inexpert can readily see the faithful resemblance of the Latin characters of the present day to those of the Pompeian wall inscriptions, or the Dacian waxen-tablets of the first and second centuries A.D. The most anct. forms of Latin literary W. are : (a) The square and Rustic capitals, and (b) uncials; then later come mingled hands of uncial and minuscule letters, and half-uncial W. W. in square capitals was neat and bears the closest possible resemblance to the familiar printed capitals of to-day, but there was no distinction drawn between N and U. The only extant specimens appear to be a few leaves of the MSS. of Virgil (fourth century A.D.). W. in Rustic capitals was more straggling in appearance, but when employed for choice literary works the characters appear to have been formed with great care. The earliest of all Latin MSS. were written in Rustic and on vellum. Instances are a poem on the Battle of Actium, discovered among the papyrus fragments of Her-culaneum, palimpsest fragments of Cicero's orations in the Vatican Library, the Codex Romanus, and the Codex Palatinus of Virgil, the Codex Bezae of Terence, and a finely executed MS. of the poems of Prudentius in the National Library

at Paris, while in the British Museum some of the Cottonian MSS. are written in a style which imitates the Rustic W. The Rom. cursive writing, i.e. old Rom. letters written at greater speed than the formal capitals or uncials, formed the common or unofficial style of W. of practically all the Latin or Rom. peoples of the first three centuries of the Christian era, or rather of such of them as could write at all. The charcoal and chalk wall inscriptions, discovered in the ruins of Pompeii and Herculaneum (according to Zangemeister's *Corpus Inscriptionum Latinarum* in the Berlin Academy), in this hand, show that it was used for poetical quotations, pasquinades, satirical remarks, love epistles, salutations, idle words, etc. These examples, however, are little better than rough scrawls, and one must turn to the more scholarly and finely executed Ws. traced with a stylus on smooth waxen tablet surfaces for the best examples of the Rom. cursive hand. It is not easy to trace the later development of this hand, however, as palaeographers are confronted with a complete dearth of records for some centuries, and when this hand reappears it has degenerated into a large straggling hand almost illegible, except by a few of the most expert readers.

Materials Used.—Rock and stone were, no doubt, the earliest materials for the reception of W., one world-famous specimen being the Rosetta Stone (see under *HIEROGLYPHICS*). In Babylonia and Assyria clay tablets were used, and cuneiform characters appear, too, on vases, bricks, and cylinders of the same material. Wooden tablets, tiles, potsherds, and shells were used, especially in Egypt, Greece, and Palestine, before the time of papyrus and parchment, while the Persians, Assyrians, and Egyptians also made use of linen and leather. But practically all the masterpieces or important records of anct. literature that have come down to us were written on papyrus, the remarkable preservative qualities of the sands of Egypt and the air-tight properties of the tombs and catacombs having saved numerous documents from the decay of time. Parchment or vellum, from its greater durability and the fact that it was much more easily obtainable than the reed from which papyrus was made, supplanted papyrus, though Bibles of the fourth century are found written on papyrus rolls as well as in parchment codices (see *MANUSCRIPTS*) or books.

Consult Thompson, *Greek and Latin Palaeography*, 1903; Taylor, *The Alphabet*, 1883; Wattenbach, *Das Schriftwesen im Mittelalter*, 1875;

E. Johnston, *Writing and Illuminating and Lettering*, 1906; *English Handwriting* (S.P.E. tract 28), 1927. See also *PALEOGRAPHY*.

Wuchang, a departmental tn. of China on the Yangtse-kiang, cap. of the prov. of Hu-peh. It is almost opposite Hankow, and is the port and customs centre for the Hankow dist. It has a government university. Pop. of W. is included in that of Hankow (*q.v.*).

Wuchow, a treaty port of China, on the Si-kiang, in the prov. of Kwang-si. It is the distributing centre between Canton, Kwang-si, and Kwei-chow, and exports sugar, various oils, hides, and aniseed. Pop. 90,000.

Wuhu, a treaty port of China, in the prov. of Ngan-hui, on an affluent of the Yangtse-kiang. It has considerable foreign trade, exporting rice, cotton, wheat, tea, furs, and feathers. It is also a manufacturing tn., and is noted for its red cord, cutlery, and steel articles. Pop. 136,000.

Wulstan, or **Wulfstan**, and sometimes **Wolstan**: (1) A monk of Winchester in the ninth century, author of a poem, in Latin hexameters, on the Miracles of St. Swithun, which is reputed the best Latin poem of that age produced in England. (2) An Archbishop of York in 1003, author of two pastoral letters and several sermons in Anglo-Saxon, the most remarkable of which is printed in Hickeys's *Thesaurus*. (3) A bishop of Worcester in the eleventh century, so renowned as to be left undisturbed in possession of his see by William the Conqueror. Famous for his sanctity, pity for repentant sinners, and benevolence towards the poor, he received the honours of popular canonization on his death in 1095.

Württemberg, a former kingdom in the S.W. of Germany, declared a People's Republic in 1918. It is bounded by Bavaria, Baden, and the Lake of Constance. It has an area of 7530 sq. m., and for the most part is mountainous, the chief mountain ranges being the Swabian Alps on the E. and the Schwarzwald which runs from S. to N. along the W. border, gradually sloping towards the centre of the country. The chief rvs. are the Neckar and the Danube, into which almost all the other rvs. discharge themselves. W. is one of the most fruitful countries of Germany, hay, potatoes, oats, barley, and wheat being the chief crops. Wine and beer are made. There are large forests. Iron and salt are worked. The manufs. include linen and woollen cloths, silks, hosiery, carpets, leather, porcelain, earthenware, iron and steel goods.

Stuttgart is the capital. Pop. (1925) 2,580,235.

Würzburg, a city of Bavaria, situated in a beautiful valley on the Main. It has been the seat of a bishop since 741, and round it an episcopal principality gradually took shape. It has numerous fine churches, a famous episcopal palace, and a university founded 1582. The dist. produces wine and fruit. Pop. (1925) 89,910.

Würzen, a tn. of Saxony, Germany. It has a twelfth-century cathedral, and manufactures of beer, machinery, carpets and textiles. Pop. 18,500.

Wusung: (1) A tn. of China, in the prov. of Kiangsu, at the mouth of the Wusung R. A pioneer railway was opened between Wusung and Shanghai in 1875, but being built without any regular permission from the Chinese gov., was ultimately destroyed. It has been rebuilt. (2) A riv. of China, which rises in Lake Sutaï, from which it issues as the Futhang-ho. It then takes the name of Hwangphu, and finally flows N. past Shanghai and enters the Yangtse-kiang estuary just below Wusung.

Wyandots, a formerly large tribe of N. American Indians, known also as Hurons. They were discovered on the E. shore of Lake Huron by the first Fr. explorers, with whom, notably with Champlain, they speedily formed an alliance. They were the traditional foes of the Sioux (*q.v.*), and in their dealings with whites were always ready to side against the Eng. settlers in America. Very few pure-blooded Wyandots remain, the most numerous colony being that of the village of Jeune-Lorette, near Quebec, where there are about 300 cultivators.

Wyandotte, a city in Wayne co., Michigan, U.S.A., on Detroit R., with manufactures of alkali, rugs and furs, soda, and starch. There are also salt works and shipbuilding works. Pop. (1930) 28,368.

Wyandotte Cave, a natural formation in Crawford co., Indiana, U.S.A., containing a greater number and variety of stalactites and stalagmites than any other cave in the U.S.A.

Wyatt, Sir Thomas (1503-42), a courtier and poet, *b.* at Allington Castle in Kent. He was one of the most accomplished men of his day and was held in high favour at court. He was frequently employed by the king in positions of trust: he went as ambassador to Charles V. of Spain, and after having received a grant of lands at Lambeth, he was named high steward of the king's manor at Maidstone in 1542. His poems were published with Surrey's in London (1557), and some of them are remarkable for their grace and elegance. His satires, too, are worthy

of mention; but he is chiefly remembered as the pioneer of the Eng. sonnet. See E. M. W. Tillyard, *The Poetry of Sir Thomas Wyatt*, 1929. Sir Thomas Wyatt, the younger, son of the above, saw service at the siege of Landrecies (1544), and ten years later led the Kentish men to Southwark, when the Spanish match was in agitation. He was captured and executed.

Wyborg, see VIBORG.

Wycherley, William (c. 1640-1716), a dramatist. His first play, *Love in a Wood*, produced in 1671, was pub. with a dedication to the Duchess of Cleveland, whose lover the author became. This was followed by other comedies, *The Gentleman Dancing-Master*, *The Country Wife*, and *The Plain Dealer*. W.'s plays are all of them ingeniously constructed, the situations are amusing, and the dialogue witty and sparkling. He was the moralist of his age, making immorality appear ridiculous, and a thorough misanthrope, he seldom allowed his characters to retain any decency. The best collected edition of W.'s works is that by M. Summers, 4 vols., 1924. See B. Dobrée, *Restoration Comedy*, 1924; W. Connelly, 'Brawny' Wycherley, 1930.

Wycliffe (spelt also Wyclif, Wiclif, Wickliffe, and in many other ways), John (*d.* 1384), an Eng. scholar and reformer, is supposed to have been *b.* about 1324 in the par. of Wycliffe near Richmond, in Yorkshire. He entered Queen's College at Oxford about 1340, but soon removed to Merton. Later he became master of Balliol, and it is in this position that the first definitely historical mention of him is found. At that time a contest was raging between the secular clergy and the Mendicant Orders, whose hold on the university was rapidly increasing. W. wrote vigorously but unsuccessfully against the Mendicants. In 1365 he resigned the mastership of Balliol for that of Canterbury Hall, then recently founded by Archbishop Islip, and in 1368 he exchanged his living of Fillingham for that of Ludgershall, in the archdeaconry of Buckinghamshire. About 1375 he was presented by the king to the rectory of Lutterworth in Leicestershire. He was already well known throughout the country, though it is now generally recognised that his controversy was more academic than popular, and that the scholastic world of Oxford was the centre of his activities and the chief audience to which he spoke. He had long been speaking freely about the relations of the civil and spiritual powers, when in 1378 the papal schism caused him to widen

the scope of his inquiries. He was vigorously supported by John of Gaunt, Duke of Lancaster, but his doctrines and teachings were unequivocally condemned by the clergy. The Convocation of his university declared his doctrines heretical, and the Archbishop of Canterbury did the same. Many of his followers were tried, and almost all recanted. He spent his latter years at Lutterworth, where his pen was as active as ever. He d. in consequence of a paralytic stroke. W.'s influence was considerable, especially in Bohemia where John Huss proved his ardent disciple. For W.'s translation of the Bible, see under BIBLE. Consult G. M. Tevelyan, *England in the Age of Wycliffe*, 1899; H. B. Workman, *John Wycliffe*, 1926; also *Wycliffe's Select English Writings*, ed. H. E. Winn, 1926.

Wycombe, Chepping, or High, a mun. bor. and market tn., Bucks, England. The church of All Saints dates from the thirteenth century. Chair-making is the leading industry. Pop. (1931) 27,990.

Wye: (1) A riv. of Wales, which rises in Plinlimmon, and after a course of 130 m. enters the Severn 2½ m. from Chepstow. It has valuable salmon fishery, and is noted in Herefordshire for its beauty. (2) A tn. in Kent. It has the South Eastern Agricultural College and a church rebuilt by Archbishop Kempe in the time of Henry VI. Pop. 1500.

Wykeham, William of (1324-1404), took deacon's orders at an early age, but was not ordained priest until 1362. In 1364 he became keeper of the privy seal; in 1366 he was elected Bishop of Winchester, and in 1367 he became Lord High Chancellor of England, holding office till 1371. Winchester College and New College, Oxford, were founded by him, the former being finished in 1394 and the latter in 1386; he also rebuilt Winchester Cathedral. He was charged with various offences committed while he was Lord High Chancellor, but the proceedings against him were abandoned, and his temporalities were restored. See G. C. Hoseltine, *William of Wykeham*, 1932.

Wylie, Elinor Hoyt (1866-1928), American poet and novelist, b. at Rosemont, Pennsylvania. Educated at Bryn Mawr and Washington. Was for a time associate editor of *Vanity Fair*. Her first poems *Nets to Catch the Wind* (1921) won the Julia Ellsworth Ford Prize. Two other books of verse, *Black Amour* (1923) and *Trivial Breath* (1928), established her reputation as a poet of imaginative conception if somewhat mechanical style. Novels: *Jennifer Lorn* (1923), *The Venetian Glass*

Nephew (1925), *The Orphan Angel* (1927), and *Mr. Hodge and Mr. Hazard* (1928).

Wymondham, a market tn. of Norfolk, England. The church comprises part of the priory founded at W. in 1107, and there is also an interesting old market cross. The industries include brewing and brush making. Pop. 5000.

Wynaad, or Wainad, a table-land of the Western Ghats, British India, about 60 m. by 30 m. It has valuable forest preserves, and produces coffee, tea, pepper, and cardamoms. It is also noted for its gold mines.

Wynberg, a suburb of Cape Town, South Africa, 146 ft. above the sea. White pop. (1926) 11,356.

Wyndham, Sir Charles (né Culverwell) (1837-1919), Eng. actor, b. in Liverpool. Educated at Sandgate, Bonn and Paris for the medical profession. W. emigrated to America, 1862, where he served as a doctor with the Federal army. Seems to have definitely elected to become an actor in 1865, when he appeared in Manchester in the rôle of Charles Surface. In 1870 he toured the U.S.A. in Bronson Howard's *Saratoga*. In this play, produced at the Court Theatre in England in 1874 as *Brighton*. The management of the Criterion Theatre, in view of difficulties over the production of *Piff-Paff*, telegraphed to him to fill the gap for a month with *Brighton*. This connection with the Criterion Theatre lasted till his death. In a few months he was partner with 'Colonel' Henderson, the lessee of the theatre. With the *Great Divorce Case* came a series of adaptations from Fr. originals. In 1886 he revived *Wild Oats*, playing his old part of Rover. Then followed a succession of 'costume comedies,' wherein his stock part was the title-rôle in *David Garrick*. In what may be regarded as the third phase of his career (1893) he produced a number of modern comedies by Henry Arthur Jones. In 1899 he left the Criterion to open his own theatre, Wyndham's. He began this venture with *Cyrano de Bergerac*, but the romantic *désvolture* of old-time chivalry was hardly suited to his special talents—eminently adapted either to 'the irresistible young scape-grace or the blithe middle-aged homilist.' W. was more at ease in *Mrs. Dane's Defence*, the last of his personal triumphs. Later he opened the New Theatre. During the period from 1886 to his death he was in close association with Miss Mary Moore, whom he married on the death of his first wife, Emma Silberrad.

Wyndham, George (1863-1913), an

Eng. politician and man of letters, b. in London, and received his education at Eton and Sandhurst. For a short time he served in the Coldstream Guards, and saw service at Snakin in 1885. He resigned in order to enter political life, and in 1898 became Under-Secretary for War. In 1900 he was made Chief Secretary for Ireland, and two years later entered the cabinet. He represented Dover in the Conservative interest from 1889 till his death. He also gained distinction as a scholar and critic. Published *Ronsard and La Pléiade. With Selections from their Poetry and some Translations*, 1906. Other publications: *The Development of the State*, 1904; *Sir Walter Scott*, 1908. See J. W. Mackail and Guy Wyndham, *Life and Letters*, 1925.

Wynkyn de Worde, see WORDE, WYNKYN DE.

Wyntoun, Andrew of, a Scottish chronicler, was prior of the monastery of St. Serf on Lochleven. He wrote *The Orygynale Cronykil of Scotland*, a work in nine books or cantos, the last four of which are devoted to Scottish history. In style the work resembles Barbour's, and it is of some importance historically.

Wyoming, a mountain-group state of the U.S.A., bounded by Montana on the N., S. Dakota and Nebraska on the E., Idaho, Montana and Utah on the W., and Utah and Colorado on the S. A lofty plateau of about 6000 ft. above sea-level traversed by mountain ranges, including the whole breadth of the Rocky Mountain system. Its length E. to W. is 365 m. N. to S. 274 m. Area, 97,914 sq. m. Gannett Peak, highest point of Wind R. Range, is 13,785 ft. Yellowstone Park is situated in this state, and is noted for its marvellous scenery and geysers. Yellowstone, Bighorn, and Powder Rs. flow E.; Snake R. rises in the N. It has great mineral wealth: coalfields, silver, gold, copper, petroleum, and iron ore. The quarries yield sandstone, limestone, and

phosphate rock. Dry farming is carried on. The crops are alfalfa, sugar beet, vegetables, and small fruits, also apples. Certain varieties of wheat and barley flourish. It is believed that dry farming may bring another 20 million acs. under production. Stock raising is the most important industry, sheep rearing being third in rank in the U.S.A. Sheep number 3,425,000. Much of the land is forested. The state owns numerous fish hatcheries and the largest elk herds in the world. Manufs. in W. are not very important, being mainly for local consumption. The most important are petroleum refining, lumber and timber products, dairy products, flour and grain, slaughtering and meat-packing, and a few others. There is a large irrigated area, much desert land being thereby rendered fertile, with 1,500,000 acres already under irrigation. The climate is good, the atmosphere being clear and dry. There is abundance of sunshine and the state has in consequence become a favourite health resort, particularly for people suffering from lung trouble. There is a state university at Laramie. Principal cities: Cheyenne, the cap. (17,361), Casper (16,619), and Laramie (8609). The largest religious body is the Rom. Catholic Church, with the Mormon Church second in numbers. W. was first settled in the seventeenth century by Spaniards. John Cotter discovered Yellowstone Park in 1807. In early days there was much fighting with the warlike Indian tribes. There was a great rush of emigrants on discovery of gold in the early 'seventies. It was only admitted to the Union in 1890. Pop. (1930) 225,565. See G. R. Hebard, *The Government of Wyoming*, 1915.

Wyoming Valley, a crescent-shaped valley in Luzerne co., Pa., U.S.A., with rich deposits of anthracite coal; noted for its scenery. The massacre of Wyoming, the subject of Campbell's poem, took place here (1778).

X to an Englishman is the representative of what might as well be denoted by the two consonants *ks*. But in the Gk. alphabet it was merely a guttural aspirate, equivalent perhaps to the Ger. *ch*. The letter X was the last in the Rom. alphabet, neither Y nor Z belonging to it. The words in which those two letters occur are not really part of the Latin language but borrowed from the Gk., as *zephyrus*, *zona*; or from some Eastern source, as *gaza*. Such forms as *lachryma*, *hyems*, *sylva*, are errors of modern editors. The Rom. themselves wrote *lacruma* or *lacrima*, *hiems*, or rather *hiemps*, and *silva*. The interchanges of *x* with other letters are as follows: (1) *x* with *c*, as in the double form of the Latin or Gk. preposition *ex* or *ec*; (2) *x* with *sc* or *sk*; (3) *x* with *g*, as in Latin *augeo* compared with the Gk. *αὔξω*; and *μύζω* compared with *mix*, Eng., and *mix-tus*, Latin; (4) *x* with *ps*, as the Latin *exilis* compared with the Gk. *ψαλς*. In chemistry, Xe is the symbol for one atom of xenon.

Xanthine (2, 6, dioxypurine), $C_8H_4N_4O_6$, a uric acid or purine derivative, is a white powder, slightly soluble in water. It occurs in the blood, in urine, and in tea, and may be prepared by reducing uric acid with sodium amalgam.

Xant(h)ippe, the wife of Socrates. Though she possessed many fine domestic virtues, she was notorious for her bad temper.

Xanthippus, an Athenian general, the father of Pericles. He was ostracised in 484 B.C., but returned to Greece at the time of Xerxes' invasion and succeeded Themistocles as commander of the fleet (479). He won a great victory against the Persians at Mycale (479).

Xanthus, the most famous city of Lycia, stood on the W. bank of the riv. of the same name. Twice in the course of its history it sustained sieges, which terminated in the self-destruction of the inhabitants with their property, first against the Persians under Harpagus, and long afterwards against the Roms. under Brutus. The city was never restored after its destruction on the latter occasion. X. was rich in temples and tombs, and other monuments of a most interesting character, and several important remains of its works of art are now exhibited in the British Museum.

Xavier, Francis, Saint (1506-52), a Spanish Jesuit missionary, 'the Apostle of the Indies,' b. at the castle of Xaviro, near Sangnessa, in Navarre. At the University of Paris he met Ignatius Loyola, with whom he was associated in the formation of the Society of Jesus (1534). He took holy orders in 1537, and for some years preached in Rome. In 1541 he sailed for the W. Indies as a missionary. After having made converts in Goa, Malacca, Travancore, the Banda Isles, the Moluccas, and Ceylon, he founded a mission in Japan (1549-51), but was forbidden to enter China. He d. at San-chian, near Canton. His *Letters* were pub. in 1631. See *Life* by Mary McClean (1896).

Xenocrates (396-314 B.C.), a famous Gk. philosopher, b. at Chalcedon. He was a disciple of Plato, and succeeded Speusippus as head of the Platonic Academy at Athens (339-314). In his system of philosophy he modified the Platonic teaching by introducing Pythagorean doctrines of numbers.

Xenon (the stranger), symbol Xe, atomic number 54, atomic weight 130.2, the heaviest of the argon group of inert gases, was obtained by Sir W. Ramsay by the fractional distillation of liquid air. It is present in the atmosphere to the extent of one part in twenty millions. The spectrum of X. shows prominent red and blue lines in the intermittent discharge, but with the 'jar' discharge green lines take the place of the red and blue.

Xenophanes (fl. 540-480 B.C.), a Gk. philosopher and poet, the founder of the Eleatic school of philosophy. He was b. at Colophon in Ionia, but settled for some time in Elea, S. Italy, where he wrote several elegiac poems, and a poem on nature in hexameters, of which fragments remain. See Bergk's *Lyrici Graeci*, ed. 1900.

Xenophon (c. 435-354 B.C.), a Gk. historian and Athenian general, was the son of Gryllus, and a friend and disciple of Socrates, who is said to have saved his life at the Battle of Delium (424). In 401 X. entered the service of the Persian prince, Cyrus the Younger, who was waging war against his sovereign and elder brother Artaxerxes Mnemon. The Gk. officers were treacherously killed after the Battle of Cunaxa, and X., with great courage and admirable skill, led

the retreat from the Tigris to Trapezus, on the Black Sea. A history of the expedition is given in his *Anabasis*. He enlisted his soldiers in the service of Lacedaemon. In 399 X. was banished from his home, either on account of his Spartan sympathies, or because of his friendship with Socrates, who was put to death in that year. In 396 he joined the Spartan army, and fought under King Agesilaus at Coroneia (394). He was rewarded with an estate at Scillus, where he settled with his wife Philesia. After the renewal of an alliance between Athens and Sparta (371), the decree of banishment against X. was repealed, and he is said to have lived for the rest of his life at Corinth. Besides the *Anabasis*, he wrote a *Life of Agesilaus*; *Hellenica*, a history of Greece from 411 to 362 B.C.; *Memorabilia*, *Apology*, *Oeconomicus*, and *Symposium*, all of which are expositions of the teachings of Socrates; *Hiero*, a dialogue on tyranny; *Cyropædia*, a political romance; *On Horsemanship*; *Hipparchicus*, on the responsibilities and powers of a cavalry officer; *Cynegeticus*, on hunting; *The Lacedæmonian Constitution*; and *The Athenian Revenues*. There have been many Eng. translations of his best-known works; H. G. Dakyns has made a complete translation (1890-94). For text, see edition by E. C. Marchant (Clarendon Press, 1900); also in the *Loeb Library* (text and trans.) *Cyropædia*, ed. W. Miller, *Hellenica*, ed. C. L. Brownson; *Anabasis*, ed. Brownson; *Symposium* and *Apology*, ed. O. J. Todd; *Memorabilia* and *Oeconomicus*, ed. Marchant, *Scripta Minora*, ed. Marchant. Also consult J. B. Bury's *Ancient Greek Historians*, 1909.

Xeres, see JERÉZ DE LA FRONTERA.

Xerxes, King of Persia (485-465 B.C.), b. about 519 B.C., was the son of Darius Hystaspes and of Atossa, daughter of Cyrus the Great. His great ambition was to conquer Greece, and with this end in view he organised a vast army, which he led across the Hellespont by means of a bridge of boats (480). Another great feat of his was the construction of a canal through Mt. Athos. He marched southwards without meeting resistance until he reached Thermopylæ, where he defeated Leonidas and his handful of Spartans. He burnt Athens to the ground, but met with a naval reverse at Artemisium, and was severely defeated at Salamis (480). He retreated to Asia, and was assassinated by Artabanus.

Kimines (or Jimines) de Cisneros, Francisco (1436-1517), a Spanish cardinal and statesman, b. at Torrelaguna in Castile. He studied at

Alcalá de Henares, Salamanca, and Rome, and receiving a papal letter of nomination, took possession of the archpriesthood of Uceda, for which he was imprisoned by the Archbishop of Toledo for six years. In 1480 he was appointed grand-vicar of Sigüenza to Cardinal Mendoza. Two years later X. took the Franciscan vows, and became confessor to Queen Isabella in 1492. The queen appointed him Archbishop of Toledo in 1495, and on her death he was appointed regent (1506) to the mad Queen Joanna. He founded the University of Alcalá de Henares (c. 1498), organised the preparation of a new Polyglot Bible, called the Complutensian (1502-17), and did his utmost to reform monastic life. In 1507 he became a cardinal, and in 1509 led in person an expedition against Oran in Africa. On the death of Ferdinand he again acted as regent (1516-17), and d. at Roa on his way to welcome the new king, Charles. See Gomez de Castro's *De Rebus Gestis Francisci Ximenii* (1569), and Lives by Barrett (1813) and Ulrich (1883).

Xisuthros, see ZIUSUDRA, DELUGE.

Xochimilco, a tn. of Mexico, 12 m. S.S.E. of the cap., with Aztec remains. Pop. 12,000.

X-Rays were discovered by Röntgen in 1895 during some experiments on the subject of electric discharges through highly evacuated tubes (see VACUUM TUBES). He was investigating the ultra-violet light produced by such tubes, and he employed a fluorescent screen covered with barium platino-cyanide in order to detect the presence of the ultra-violet light. He discovered that this screen continued to fluoresce even when the discharge tube was completely covered with opaque paper; further he found that heavy objects interposed between the tube and the screen stopped the fluorescence. It was clear, then, that some kind of radiation was emitted from the tube that could penetrate opaque paper and cause the screen to fluoresce, and that this radiation was absorbed by heavy objects. Being ignorant of the nature of this radiation, Röntgen called it X-rays.

Methods of Production.—Intensive research on X-rays followed Röntgen's discovery, and the best method of producing these rays was gradually evolved. Until 1913 the most satisfactory X-ray bulb was of the design shown in Fig. 1. *C* is the cathode, made of aluminium, concave in shape in order to focus the cathode rays (*q.v.*) on the metal plate *T*, known as the target. This target is the anode, but it is found that the discharge takes place more steadily when there

is a second anode *A* present. The target is the source of the X-rays, and as it gets very hot it is made of a metal such as tungsten which has a high melting-point. The tube is fairly highly evacuated, requiring a potential difference of about 40,000 volts between the anode and the

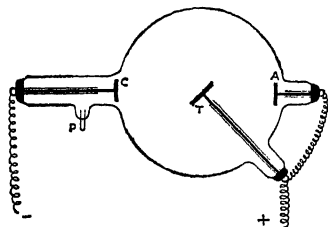


FIG. 1

cathode in order to produce a discharge. The source of this potential difference is the secondary of a transformer or induction coil, the primary of which is connected to a battery of a few accumulators. In course of time the residual gas is occluded by the glass walls and in order to restore the tube to its former condition the palladium tube *P* is gently heated by means of a Bunsen

bulb, invented in 1913, is shown in Fig. 2. The tube is highly evacuated, the pressure inside being of the order of 10^{-6} mm. of mercury. The source of the electrons is the flat spiral *S* of tungsten that is heated by means of a small battery of accumulators (see THERMIONICS). The spiral is surrounded by a short tube of molybdenum and this serves to focus the cathode rays on the adjacent target *T*. The latter is made of tungsten and is solid, so that the danger of overheating through the impact of the electrons is minimised. The great advantage of the Coolidge bulb over the older type lies in the fact that the source of electrons is independent of the potential difference between the anode and the cathode. Thus the stream of electrons can be increased or decreased by increasing or decreasing the current through the spiral, while the hardness of the X-rays can be increased by increasing the potential difference between the anode and the cathode. The most satisfactory source of potential difference is a transformer working with an interrupter, and a potential difference of about 70,000 volts is commonly used with these tubes.

Nature and Properties.—X-rays are electromagnetic waves, identical in character with wireless waves and light waves, but differing in degree,

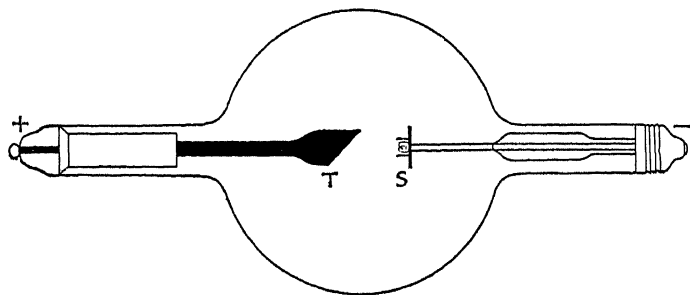


FIG. 2

burner. The palladium tube is gas-tight when cold, but lets hydrogen through quite freely when hot, so that traces of free hydrogen in the Bunsen flame find their way inside the bulb. This type of tube is still widely used, but for such purposes as deep X-ray therapy it has been displaced by the Coolidge bulb, that is vastly superior to its predecessor, both in point of steadiness of running and in the 'hardness' or penetrating power of the X-rays it emits. The Coolidge

being extremely short waves. The softest or least penetrating X-rays have wave-lengths of the order of 2×10^{-8} cm., while the hardest rays produced by the Coolidge bulb are as short as 6×10^{-10} cm. Their peculiar properties are due to the fact that their wave-lengths are so minute. They can penetrate bodies opaque to ordinary light because the distance between the atoms of the body is of the same order as the wave-length of the X-rays (see DIR-

FRACTION. The absorption of X-rays by bodies depends on the nature of the atoms of which the body is constituted; the heavier the atoms the greater the absorption of the X-rays. A thin sheet of lead, for example, will absorb an appreciable amount of a hard beam of X-rays that will penetrate several feet of wood. A beam of X-rays passing through a human body is less readily absorbed by the flesh than by the bone; hence if a fluorescent screen is placed behind the body the bones will be revealed by the 'shadows' they cast on the screen that is illuminated more intensely behind the fleshy parts. Permanent X-ray records of an examination are obtained by replacing the fluorescent screen by a photographic plate which is sensitive to X-rays. The modern Coolidge bulbs reveal the internal structure of the human body in great detail. Closer examination of the organs is achieved by making the patient consume food containing salts of bismuth or barium, as these are relatively opaque to X-rays.

Radiotherapy.—Skin diseases such as acne and ringworm have long been successfully treated by X-rays. Living cells are not so easily destroyed by X-rays as the malignant ones, and in the hands of an experienced radiologist there is no danger attached to radiotherapeutic treatment. Deep-seated growths are successfully treated by the penetrating X-rays emitted from modern bulbs. Cancerous growths have yielded to this treatment, yet many failures indicate that X-rays do not form a specific against this disease. Undoubtedly the explanation of the therapeutic value of X-ray treatment is that X-rays, in ejecting electrons from the atoms of a substance through which they pass, cause a transmutation followed by the decay of the malignant cells. In this they produce similar effects to the even harder γ -rays of radium (*q.v.*).

Origin of X-Rays.—The question of the origin of X-rays is closely related to the problem of the structure of the atom. These problems have been the subject of continuous intensive research for over thirty years and contributions to the subject have been made by almost all the famous physicists of to-day. The X-rays are generated by the impact of the high-speed electrons on the target of the X-ray bulb. If such an electron penetrates an atom of the target and is deflected by the nucleus (*q.v.*) of the atom, it cannot take up a permanent residence in one of the inner electronic orbits of the atom, since these are already occupied,

unless another electron is ejected. Two things may happen: (a) the electron may take the place of one of the electrons already in an inner orbit; (b) it may itself escape with reduced energy after its collision. The remainder of its energy appears as X-radiation; the effect is really a reversal of the photo-electric effect. The greatest possible frequency of the X-radiation emitted occurs when the electron escapes with zero energy; the quantum theory (*q.v.*) then tells us that the frequency of the X-radiation is given by the equation $\frac{1}{2}mv^2 = h\nu$, where m is the mass of the electron, v its original velocity on impact, and ν is the frequency of the X-radiation; h is Planck's constant (see QUANTUM THEORY). This result agrees with experimental determination of the wave-lengths of X-rays by measuring the diffraction caused when the X-rays pass through a crystalline substance.

Industrial Applications of X-rays are almost unlimited in their range. Wherever and whenever it is highly important to probe the interior of a finished article of manufacture without damaging it in any way, recourse is made to X-ray examination. Hidden fractures in metal castings or weldings; internal faults and flaws in timber for aeroplanes, etc.; defective golf balls and glass; the discrimination between real and artificial gems; the examination of leather and the fit of boots and shoes, all these are revealed by routine X-ray examination, while fraudulent paintings alleged to be 'old masters' are detected at once by such an examination that has also proved its value in detecting alterations to genuine masterpieces. See Bragg, *X-Rays and Crystal Structure*; Kaye, *Practical Applications of X-rays*; Compton, *X-Rays and Electrons*; Kaye, *X-Rays*.

Xylol, the commercial name given to the mixture of xylenes obtained from coal-tar. Xylene, or dimethylbenzene, $C_6H_4(CH_3)_2$, exists in ortho-, meta-, and para-isomeric forms and the three are similar in physical properties (boiling point 138° – 143° C.).

Xylonite, see CELLULOID.

Xylophagidae, a family of flies which suck the juices of plants and the sap of trees.

Xylophone, a musical instrument of percussion constructed on the principle of the harp, but generally consisting of wooden bars and struck with hammers in a horizontal position.

X Y Z Correspondence. President Adams of the U.S.A. used this term in the Congress reports for the letters of Marshall, Pinckney, and Gerry, who were ambassadors to Talleyrand in France.

Y

Y has found its way into the alphabets of W. Europe through the later Latin alphabet. The sound of *y*, so familiar to the Eng. at the beginning of words, as in *yes*, *young*, *yoke*, was represented in Latin by a mere *i*, which, however, when so used, received from the grammarians the distinctive name of *i consonans*. Our modern editors have for the most part substituted for it a *j*. Thus, *iugum*, or rather *ivgvm*, which is now written *jugum*, commenced with a sound which is commonly held to have been the same with our initial *y* in *yoke*. The Eng. have a habit of expressing the sound, though they do not write the letter, whenever a long *u* begins a word, as *union*, *unity*, *useful*: so that those who write *an useful contrivance* insert a letter at the end of the first word which no one would pronounce. In Anglo-Saxon the sound of a *y* was commonly represented by an *e* before *a* or *o*, and by an *i* before *e* or *u*, in which cases the allied languages of Iceland, Denmark, and Sweden for the most part employ a *j*. In chemistry, Yb and Yt are the atomic symbols of the metals ytterbium and yttrium, respectively.

Yablonoi, or Yablonovoi, a range of mountains in S.E. Siberia, between Transbaikalia and the Stanovoi Mts., nearly 1000 m. in length. Mt. Sokhondo (8050 ft.) is the highest peak.

Yacht, generally a small, light vessel used for pleasure-cruising or racing. From earliest times wealthy men have fitted up vessels for their personal use and gradually there have evolved types of craft, moderate in size, which are luxuriously appointed and capable of travelling all over the world. Ys. fall naturally into two classes, viz. sailing Ys. and power-driven Ys., each group being capable of further subdivision into cruising and racing types. Power-driven vessels are the more costly to buy and maintain and are used mainly for cruising. Steam-engines were the first prime movers used for the propulsion of Ys., but the introduction and development of the internal combustion engine have been

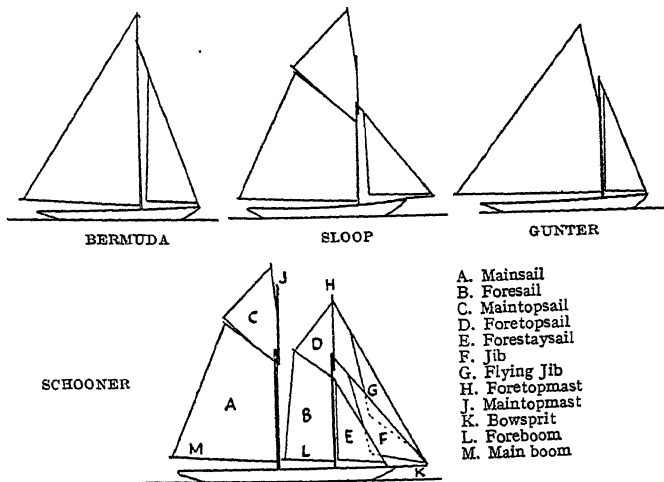
responsible for their replacement by engines of the latter class. Small vessels now being constructed are, as a rule, driven by petrol or paraffin engines, whilst Ys. of the larger sizes are almost invariably engined by 'Diesels' or 'Semi-Diesels.' When sailing Ys. are designed for cruising it is usual to instal an auxiliary engine for use when entering and leaving harbour or when conditions are unsuitable for sailing.

Sailing vessels are described by the manner in which they are rigged, though in the case of racing craft modifications of the standard rigs have been adopted as a result of the various classification and handicapping rules made by yachting clubs. The commonest rig is the 'cutter,' which consists of a mainsail, topsail, jib, and foresail; the 'sloop' is similar in rig, but has only a single large foresail instead of the two smaller ones of the cutter. For small Ys., the 'gunter rig' is frequently adopted, consisting of a mainsail having a high-peaked gaff and a foresail. A most efficient mode of rigging much used for racing craft is known as the 'Bermudian' or 'Marconi' rig. In this case an extremely tall mast carries a triangular mainsail, which by virtue of its shape offers a very long leading-edge of sail to the wind. The similarity of the long mast to the wireless pole is responsible for the name Marconi being applied, whilst the other name originated from the fact that local vessels sailing in the vicinity of the Bermudas adopted this style of rigging. The King's Y., *Britannia*, was converted to the Bermudian rig for the 1931 racing season. 'Yawls' and 'ketches' are similar to cutters, but they carry a small additional mast, with main and topsails, placed behind the mainmast. In the yawls the small mizzen-mast is placed abaft the sternpost, whilst in the ketch it is placed forward of the sternpost. Some of the fastest yachts are 'schooner' rigged. A schooner has two or more masts, each carrying sails similar to the cutter—sometimes

they are Bermuda-rigged for racing—with the usual jibs and foresails attached to the foremast and bowsprit. A few large Ys. used for cruising are square-rigged.

Experience has shown that the maximum speeds which can be attained by Ys. of normal design, in a strong wind, is roughly proportioned to the square root of their rating length. Before the nineteenth century vessels of different tonnage and varying rigs raced without systematic handicapping, but as Y. clubs were

the British style of handicapping was not adopted. A new rule in 1887 determined the rating by the factors of length and sail area. The length being measured at the water-line, designers now aimed at building a dish-shaped vessel with a large amount of overhang at stem and stern, and rendered stable by a heavy keel, which developed later into a long fin weighted at the extremity with a heavy mass of lead. Later rules have brought more factors into the rating, and the present rules, adopted by the Inter-



YACHTS, METHODS OF RIGGING

(See also illustrations on p. 377 of Vol. XI.)

formed for the purpose of promoting racing, the tendency towards building ships with a direct view to racing led to the establishment of rules for determining handicaps. The most prominent of British yachting clubs started as the Yacht Club in 1812, became the Royal Yacht Club in 1820, and has been styled the Royal Yacht Squadron since 1833. In 1875 the Yacht Racing Association was established to govern the conditions of racing. The original method of handicapping was based on tonnage only, a quantity arrived at by multiplying the length by the square of the breadth. It was found that this condition favoured the building of long, narrow vessels with heavy keels. These vessels, however, were not very successful in racing foreign Ys. when

national Yacht Racing Union, were designed to produce habitable vessels which could be economically operated by a relatively small crew. Two rules were drawn up, one for the smaller craft up to 12 metres rated length and the other for vessels above 12 metres. In the former the rating length is found by dividing by $2\frac{1}{2}$ the length at the water-line when in racing trim + $\frac{1}{4}$ of the chain girth + twice the difference between the skin and chain girths, neglecting the keel, + the square root of the sail area — the freeboard. For Ys. above 12 metres long the rating length is arrived at by dividing by 2.3 the length at water-line + the square root of the sail area — freeboard. In each case limits were imposed upon draught and height of mast or sail areas. The

minimum displacement, in tons, allowable for vessels dealt with by the above rating rules is given by dividing by 35 the cube of ($\frac{1}{2}$ length at water-line in ft. + $\frac{1}{4}$). In racing Ys. are given a time-allowance for every metre of their rating according to class, and this allowance is adjusted to its actual time, all Ys. being presumed to start when the starting gun is fired. The starting line is an imaginary one drawn between two shore marks, or a buoy and a mark. Five minutes after the warning flag a gun is fired, when the Ys. begin to manoeuvre for position. The actual line must not be crossed until the starting gun is fired five minutes later, or, if it is crossed, the Y. must recross according to sailing rules. The sailing rules are very stringent, and skilled judgment on the part of the helmsmen is as essential a factor in the success of a Y. as its sailing properties.

The most famous international Y. race is that for the America's Cup. This trophy was originally given by the Royal Yacht Squadron in 1851 for a race round the Isle of Wight, open to all comers, there being no limit as to design of the competing craft. This was won by the American Y. *America*, whose owner subsequently presented it to the New York Yacht Club as a challenge trophy and named it the America's Cup. One of the most persistent challengers was the late Sir Thomas Lipton, who spent hundreds of thousands of pounds in trying to regain the Cup for Britain. He built in all five Ys. each named *Shamrock*, but never succeeded. The last race took place in America in 1930, when *Shamrock* was badly beaten by *Enterprise*.

The construction and racing of model Ys. is a popular pastime in all parts of the world. In Britain all model-Y. clubs are united under the leadership of a central body known as the Model Yacht Racing Association, which organises national and international regattas. Ice Ys. are contrivances, cutter or yawl rigged, with the keel replaced by runners for sailing over ice. Steering is effected by means of a movable runner at the stern. Land Ys. are fitted on wheels, and rigged in the same manner as sea Ys. They are usually of small size and are adapted for sailing on a long stretch of level beach, where they attain a high speed.

Yajñavalkya, a Hindu sage who lived about the middle of the fourth century. He was responsible for a code of laws which is not dissimilar to the laws of Manu, and is regarded by the Hindus as one of their sacred books.

Yak, Grunting Ox, or *Poëphagus grunniens*, a large Tibetan ox which exists both in the wild and domesticated state. Two of its chief characteristics are the fringe of long, pendulous hair along each flank and the huge whisk of hair at the end of the tail. In summer the coat is a deep, rich brown; the horns are black, large and strong. The distinction between wild and domesticated Ys. is the grey hair on the nostrils of the former. They can live at very high altitudes, and the domesticated animal is used as a beast of burden and yields milk and meat.

Yakoba, or Yakubu, a tn. of N. Nigeria, Africa, in Sokoto. Manufs. cotton. Pop. 30,000.

Yakub Beg (1820-77), Sultan of Kashgar. He defended Tashkent against the Russians in 1864. During the insurrection of the Doungans against the Chinese he made himself master of Chinese Turkestan. He was defeated by the Chinese in 1876 and assassinated by a servant.

Yakuts, the people who inhabit the prov. of Yakutsk, in Siberia. They are a northern branch of the Turkish race who came into Siberia about the beginning of the fourteenth century. The Y. are a pastoral and primitive people, spending much of their time in pursuit of the wild animals indigenous to the country. They have some considerable trade with Russia in furs and skins. They number about 300,000 and are nominally Christian.

Yakutsk, or Jakutsk: (1) A former large prov. in E. Siberia, now the Yakutsk Aut. S.S.R. The Arctic Ocean is its N. boundary, and the Siberian and Far-Eastern Areas bound it W., S., and E. It has an area of about 1,460,000 sq. m. In the S.E. is a densely wooded plateau, in which abound wild beasts, of great commercial value on account of their fur. The most important rivs. are the Lena and its affluents, the Olonek, Yana, and Indighirka. The climate in the N. reaches the extreme of cold, but in the S. crops of wheat, barley, etc., are raised. Hunting and gold-mining are the chief industries. For transporting gold and furs an air service has been started between Y. and Irkutsk. Pop. (1926) 300,000. (2) The cap. of the above, situated on the R. Lena. It was established as a Cosack station in 1632. It is the centre for trade in furs. Pop. (1926) 10,508.

Yale, Elihu (1649-1721), a patron of Yale University. He was b. at New Haven, Connecticut, entered the service of the East India Company (1672), and became governor of Fort St. George, Madras (1687). He gave £800 and books to the collegiate school at New Haven, and the

whole university was called after him.

Yale University, one of the oldest and most famous in the U.S.A., is located at New Haven, Connecticut. The charter for a school of higher learning was granted to the colony of Connecticut in 1701, it being the aim to rival Harvard, which had been established since 1636. The university of to-day dates from 1718, when it was finally decided to establish it in New Haven. It was named after Elihu Yale (*q.v.*). Most of the famous university songs, therefore, celebrate the fame of 'Eli Yale. To-day it is one of the richest in the U.S.A., and almost any subject may be studied there. Among its famous schools are the Sheffield Scientific School (1847), the School of Fine Arts (1866), and the School of Music (1894). It has also schools of law (1824), medicine (1913), divinity (1822), forestry (1900), and nursing (1923). Since 1920 the undergraduate freshman year has been under the jurisdiction of a separate dean and faculty. It has about 5700 students and a faculty of nearly 1200 (over 200 of professorial rank; and over 200 associate professors and assistant professors). The completion of the Brady Memorial Laboratory in 1928 increased the faculties of the school of medicine, as did that of the Lauder Hall, and the Farnam Memorial Building. The facilities of the law school have also been increased recently by the construction of the Sterling law building.

Yalta, a watering-place and seaport of the Crimean Aut. S.S.R., Russia. Pop. 22,953.

Yalu, a riv. which forms a boundary line between Korea and Manchuria. It rises in Paiktu-San, and after a course of 300 m. empties itself into Korea Bay, near Wi-ju. It is navigable for small rafts for 145 m. It was the scene of several skirmishes during the Russo-Japanese War (1904).

Yam, the edible tuberous root of many species of Dioscorea, and much grown in tropical countries, where they take the place of the potato. Some species yield tubers of enormous size. Ys. are sometimes grown in Britain, chiefly for the ornamental value of the twining branches and white or yellow flowers.

Yama, in Hindu mythology, the judge and ruler of the departed. He is represented of a green colour, with red garments, crowned, four-armed, and sitting on a buffalo. He holds a club and noose, with which the soul is drawn from the deceased's body. Y. had a twin sister, Yami, and the two were thought to represent the first human pair.

Yamagata, a tn. of Japan, 170 m. N.E. of Tokyo. Pop. (1925) 55,994.

Yanbu, or **Yembo**, a port of Arabia, on the Red Sea. Pop. over 5000.

Yang-tse-kiang, the greatest riv. of China. Its source is in the Tang-la Mts. of the Kuen-lun system in Central Tibet. It originates in a number of dashing torrents which are more than 16,000 ft. above the sea-level. Under the name of the Kin-sha-kiang, it flows in an easterly direction through the prov. of Yunnan, and turning northwards forms part of the boundary line between that prov. and Szechuen. At this stage in its course it receives the waters of the Ya-long-kiang from the N., and the Heng Nan-kwang and K'i-kiang from the S. Having a tortuous course, bending in an E.N.E. direction, it waters the provs. of Szechuen, Hupeh, Kiangsi, Hunan, Nganhwei, Kiangsu, and finally empties itself into the Yellow Sea. Its chief tributaries in China which have not already been mentioned are the Min, T'o, Kia-ling, and Han from the N., and the Wu from the S. The total length is some 3000 m., of which 1500 are navigable by native rafts. The area drained by the Yang-tse is estimated at over 650,000 sq. m. The chief tns. on its banks are: Fu-chow, P'ing-shiu-hien, Chung-Kiang, Hankow, Wu-chang, Nanking, and Ching-Kiang.

Yanina, see JANINA.

Yankee, a term now used in Europe for anyone b. in the U.S.A. During the War of Independence it was derisively applied by British soldiers to the New Englanders.

Yankee Doodle, a popular air of America, was probably a British tune taken to America prior to the War of Independence. The words are by Dr. Schuckburgh, a British medical officer.

Yankton, co. seat of Yankton co., S. Dakota, U.S.A., the seat of an important college. Pop. (1930) 6072.

Yap, a Japanese island of the Caroline group in the Pacific, centre of administration for the Western Carolines; an important wireless and cable station. Population about 8000.

Yapock (*Cheironectes variegatus*), a S. American marsupial about the size of a rat and with webbed hind feet, being aquatic in habit.

Yard, a measure of length, equaling 3 ft., or 36 in., being the standard. The length of the arm of King Henry I. was made the length of the *ulna* or ell, which answers to the modern yard. See ELL; WEIGHTS AND MEASURES.

Yare, a riv. of Norfolk, England, which empties into the sea at Yarmouth. Length 50 m.

Yarkand, a walled city of Sinkiang, very near the R. Yarkand, about 100 m. S.E. of Kashgar. It has many mosques, caravanserais, Mohammedan colleges and bazaars. Leather goods, silk, carpets, and felt are among its manufs., and trade is chiefly with Russia and Kashmir. Pop. about 100,000.

Yarmouth: (1) Or Great Yarmouth, a parl. and co. bor., seaside resort, and port of Norfolk, England, 20 m. E. of Norwich. It has a good harbour at the mouth of the Yare, with shipbuilding yards. The fisheries are excellent, the chief fish caught being herrings, mackerel, cod, and white fish. Pop. (1931) 56,770. (2) A small seaport on the N.W. coast of the Isle of Wight, 10 m. W. of Newport, on the mouth of the Yare. There is good yachting. Pop. 900. (3) The cap. of Yarmouth co., Nova Scotia, Canada, on the Bay of Fundy. It has shipbuilding yards, fisheries, and manufs. of machinery, boots, cotton goods, etc. Pop. (1926) 7073.

Yarmouth Roads, a roadstead in the North Sea, off Norfolk, England, affording fairly safe anchorage.

Yarn, spun fibres ready for being woven into cloth. When the fibres are simply twisted together, the material is known as single Y. Cotton Y. is counted by the number of single hanks of 840 yds. each in 1 lb. (avoirdupois); thus, Y. running thirty such hanks to the lb. would be called thirty counts. Linen Ys. are of two kinds, line and tow. They are counted by the number of leas of 300 yds. in 1 lb. Woollen Y. is soft, fluffy, and elastic. In the W. of England it is counted by the number of hanks of 320 yds. in 1 lb., in some parts of Yorkshire by the number of yards in 1 oz.; each district, however, has its own method of counting. Worsted Y. is smooth and strong. It is counted by the number of hanks of 560 yds. in 1 lb. Net silk may be Organzine or Tram; the former is more twisted than the latter, but both are very strong. Spun silk is made from the silk set aside in the manufacture of fabrics from the cocoons. Silk Ys. are counted by the weight of 1000 yds. in drams, or by the number of deniers in one hank, a denier being equal to $\frac{1}{25.5}$ lb. Ys. are folded for greater strength. Folded Ys. are counted according to the number of threads; thus two sixties means that two threads of sixty hanks to the lb. were twisted together, the quotient, therefore, being thirty hanks to the lb.

Yaroslav, or Jaroslav, a tn. of Central Russia, in the Ivanovo Industrial Area, on the Volga, 160 m.

N.E. of Moscow. A university was established in 1919. It manufs. silk, tobacco, cotton, and linen. Pop. (1926) 114,282.

Yarrow, or Milfoil (*Achillea millefolium*), a common wayside plant (order Compositae).

Yassy, see JASSY.

Yawl, see SAILS AND RIGGING.

Yaws, or *Framboesia*, a tropical disease characterised by the formation of red, raspberry-like tubercles upon the face, toes, and genital organs. It is an infectious disease, and chiefly affects young negroes, though white men may suffer from it. It is endemic in the tropical parts of Africa, in Ceylon, East and West Indies, and many of the Pacific islands. The treatment consists of absolute cleanliness, together with the application of antiseptic lotions.

Yazoo City, the cap. of Yazoo co., Mississippi, U.S.A. Pop. (1930) 5579.

Year. There are three kinds of Y. That most usually employed is the *solar*, *tropical*, or *equinoctial* Y. This is the period intervening between a position of the sun and the occurrence of the next identical position, after its cycle of ascent and descent on the meridian. This is conveniently taken from equinox to equinox, when the sun is vertical at the equator, or, as reckoned in the calendar, from winter solstice to winter solstice. The position of the sun is determined by the revolution of the earth in its orbit and by the inclination of its axis. The change in inclination resulting in the precession of the equinoxes (*q.v.*) causes the sun to appear in the same position earlier by 20 mins. than if the observation were made on a star. The latter gives the true period of revolution or *sidereal* Y., but as the seasons depend on the sun's position, it is more convenient to use the *tropical* Y. for everyday purposes, the former being more usual for astronomical calculations. The *sidereal* Y. is 365 days 6 hrs. 9 mins. 9 secs.; the *tropical* 365 days 5 hrs. 48 mins. 46 secs. The *anomalous* Y. is reckoned from perihelion to perihelion, and as the line of apsides (*q.v.*) moves constantly slowly eastwards, the length is greater by $4\frac{1}{2}$ mins., being 365 days 6 hrs. 13 mins. 43 secs. This is used astronomically in calculations on perturbations. The measurement of time over extended periods in anct. times, or among barbarous peoples, was usually based on seasonal activity, but religious observances soon introduced more accurate methods, which depended on the more easily recognised changes in the phases of the moon. Lunar changes are, however, incommensurable with the *tropical* Y., and it was

usual to have a lunar calendar, with arrangement for interpolating days or months to keep the seasons in place. The Mohammedan reckoning is still lunar, the Y. having 12 lunar months, and contains alternately 354 and 355 days. This gives a gain of 1 in 33 and causes the seasons continually to fall in different months. The *Metonic cycle*, discovered by Meton about 433 B.C., among the Gks., was reckoned from new moon to new moon, and contained 235 synodic months, approximately 19 Ys. of 365½ days. This cycle still remains in the *Golden Number*, which is found by adding 1 to the date number and dividing by 19, the remainder being the required number; if 0, it is considered 19. The *Calliptic cycle* takes account of leap Ys., and consists of 4 Metonic cycles or 76 Ys. In the Y. 45 B.C. Julius Cæsar, with the help of Sosigenes, reformed the calendar, and introduced the *bissextile Y.*, or leap Y., the sixth day before the kalends of March being counted twice. The previous Y. was made 445 days long and was known as the Y. of confusion. The Y. being approximately 365½ days, and only 365 being counted, an odd day is added every four Ys. to compensate; these are leap Ys. This, however, over-compensates, and three leap years are omitted in every four centuries in order to correct the error which arises from the excess of the addition of one day in four years (i.e. 6 hours) to the year over the true length of the Y., i.e. 365 days 5 hrs. 49 mins. The *fictional Y.*, used in the reduction of star places, begins at the moment when the sun's mean longitude is 280°, which always occurs some time during Dec. 31; the star catalogue takes no account of aberration or the irregular motion of the celestial pole, and the reduction is necessary to give apparent instead of mean position. The *Julian cycle* consists of 7980 Ys. of 365½ days; its starting point is Jan. 1, 4713 B.C., Jan. 1, A.D. 1 being J. E. 4714. The *Julian Ys.* are used in astronomy as harmonising different chronological systems. *Jewish Ys.* are arranged in cycles of 19; the 'embolismic' Ys., the 3rd, 6th, 8th, 11th, 14th, 17th, and 19th have 13, the others 12 months each.

Yeast, or *Saccharomyces*, is an Ascomycetous fungus consisting of small rounded cells which multiply by budding in certain sugar solutions containing traces of mineral salts. Enzymes (q.v.) within the plant effect alcoholic fermentation (q.v.) which proceeds best at a temperature of about 30° C. (see BREWING). When conditions arise unfavourable to

growth, the Y. cell forms within it usually four thick-walled ascospores which rest until conditions favour their germination (see FUNGI). There are many different species of Y., that used for brewing not being the same as that used in bread-making, etc. Ys. are rich in vitamins, and are used medicinally for the treatment of constipation, lassitude, etc.

Yeats, William Butler, a poet and critic, b. in Dublin, June 13, 1861. Educated at Godolphin School, Hammersmith, and Erasmus Smith School, Dublin, and studied painting, but soon realised that his true bent was for literature. Since then he has pub. numerous books of verse, his earlier notable productions being *The Wanderings of Oisín*, 1889; *The Wind among the Reeds*, 1899; and *Poems*, 1899; while he edited the writings of Blake and issued a volume of essays, *Ideas of Good and Evil*, 1903. He has lectured both in England and America, while he was among those instrumental in founding the Literary Theatre in Dublin. This theatre became known as the Abbey Theatre, of which Y. is a director. There is a very marked difference between his early work, full as it is of splendid rhetoric, e.g. *The Wanderings of Oisín*, and the conscious art which asserts itself in such later work as *The Wild Swans of Coole* (1919). In both there is simplicity, but whereas in the earlier work the simplicity is spontaneous, in the later it is studied. *The Isle of Innisfree* and *The Rose of the World* showed that he knew how to versify the stories of his country in the natural language of broad vowels and single-syllabled words. The late work, which voices new theories and looks to new worlds, owes much of its inspiration to a profound mysticism which renders many of the poems obscure to anything but a specialised interpretation. He is happiest when weaving moving images out of the most commonplace suggestions from the things around him. This is notably illustrated in the *Ballad of Father Gilligan*; *A Dream of Death* (an epitaph) and *A Dream of a Blessed Spirit*, which have something of the savour of fairy incantation; and also in the beautiful poems *The Sorrow of Love* and *Innisfree*. This last-named poem is inspired by Ronsard's sonnet to Hélène, but is re-invested with a new beauty of its own. Mention may be made of the *Countess of Cathleen*, which is directly from the Fr. source and is one of the finest of the plays of Y., but somewhat wanting in dramatic power, though it contains some of the most finished poetry he has produced. His later works include *Plays for an Irish*

Theatre, 1912; *Responsibilities*, 1914; *Reveries*, 1916; *The Cutting of an Agate*, 1919; *Michael Robartes and the Dancer*, 1921; *Seven Poems and a Fragment*, 1922; *The Trembling of the Veil* (privately printed), 1922; *Later Poems*, 1923; *Plays in Prose and Verse*, 1923; *Plays and Controversies*, 1923; *Essays*, 1924; *Early Poems and Stories*, 1926 (the first vols. of a new collected edition); *A Vision*, 1926; *Autobiographies*, 1926; and *The Tower*, 1927, a vol. of poems which re-established Y.'s early reputation. Y. became a senator of the Irish Free State in 1922. In 1923 he was awarded the Nobel prize for literature.

Yedo, see TOKYO.

Yekaterinburg, see EKATERINBURG.

Yekaterinodar, or Ekaterinodar, now known as Krasnodar, a tn. of the N. Caucasian Area, Soviet Russia, on the Kuban, with extensive trade in flour and corn. Pop. 161,172.

Yekaterinoslav, see EKATERINOSLAV.

Yelisavetgrad, see ZINOVIEVSK.

Yelisavetpol, or Elisabetpol, now known as Gandzha: (1) A former gov. in Transcaucasia, Russia, extending from the Caucasus to the borders of Persia, now part of the Azerbaijan S.S.R. (2) City of Azerbaijan S.S.R. It has many mosques, and its fortifications still stand. It trades in cereals, wine, and copper. Pop. 55,510.

Yellow Bird, the name for two N. American birds, *Chrysomitris tristis*, goldfinch or thistle bird, and *Dendroica aestiva*, yellow poll warbler.

Yellow Fever, or Yellow Jack, is an endemic fever occurring in tropical and subtropical regions except where rainfall is deficient; the region round the Gulf of Guinea and the Caribbean Sea, the noted areas, includes the W. Indies. Y. F. occurs also on the W. coast and the Brazilian coast of tropical S. America, and in Central America. In Africa it extends along the coastal regions from Senegal to the Congo. It has spread as an epidemic further northward into the U.S.A. With the usual rise of temperature, vomiting and rigor are found after an incubation period usually of from one to four days. This in slight cases is the whole course. In severe cases, jaundice and hæmorrhage are prominent symptoms, and as a rule a complete and serious reaction sets in after the first stage. Hæmorrhage becomes very prominent, stools and vomit being both affected. Both skin and kidneys exhibit hæmorrhage, and it is also common from the gums; the urine also contains excessive albumen. The usual treatment for fevers is employed, but with no great effect, the disease being one of the most fatal. Morphine injections are

given hypodermically, and enemata are administered in a nutritious form, while the heart is stimulated by tonics. Results of recent research indicate the probable value of vaccines made from infected monkeys. One attack usually gives immunity; the negro is very little susceptible. Although the specific poison has not been discovered, the epidemiological observations of Dr. C. Finlay of Havana led him in 1881 to suggest that the transmission of the disease was effected by mosquitoes. The American Commission of 1900 traced the disease to the mosquito formerly named *Stegomyia fasciata*, but now known as *Aedes aegypti* (*Aedes argenteus*, or *Aedes calopus*). J. H. Bauer has shown that other species of mosquito may also transmit Y. F. Major W. C. Gorgas of the U.S.A. carried out thorough tests of preventive measures in 1901. These were based on the prevention of breeding by the mosquito, by keeping all water vessels mosquito-proof and covering puddles and stagnant water with oil; drainage and sanitation were thoroughly inspected and improved with the same purposes. Within six months the disease disappeared for the first time in Havana. The similar thorough measures so brilliantly carried out in the Panama Canal Zone completely confirmed the efficacy of the methods. In the autumn of 1927, the Fr. Colonial Gov. joined in the crusade against the disease, and very soon it had been suppressed throughout Fr. West Africa. The consensus of opinion among students of the disease is that African Y. F. is not due to the organism isolated and cultivated by the late Dr. Noguchi from subjects with American Y. F. and named by him *Leptospira icterodes*. Opinion now seems to incline to the old belief that the disease is due to a filtering virus. See EPIDEMIOLOGY; TROPICAL MEDICINE.

Yellow Hammer, or Yellow Bunting (*Emberiza citrinella*), a common British bunting about 7 in. long, with a yellow head streaked with brown, and a slightly forked tail. The nest is built on the ground, and contains five eggs. It feeds largely on insects, but fruit and grain are also eaten.

Yellow Pigments, see PIGMENTS.

Yellow River, or Hoang-Ho, a riv. of China, which rises on the Odontala plain, in the territory of Kuku-nor, Tibet. After an extremely tortuous course, it crosses the Chinese prov. of Kansu, flows into Mongolia, and then turns almost at right angles eastward into Shansi. It separates Shensi from Shansi, passes through Ho-nan, and flows into the Gulf of Pechili. The most important

tns. on its banks are Lun-Chow and K'ai-fung, and its chief tributaries are the Wei-ho coming from the W., and the Ta-tung-ho from the N. The riv. has come to be known as 'China's sorrow' on account of its tendency to burst its banks and to change its course. Formerly its mouth was in the Yellow Sea. Its dams and dykes date from very early times. The Y. R. is the second longest in China, and has a length of about 2500 m.

Yellow Sea (Hoang-Hai, or Hwang-Hai), a large gulf of the Pacific Ocean, its length being about 620 m., and its greatest width 400 m. It is divided into the gulfs of Korea, Liao-tung, and Pechili, and to the E. is studded with islands. Its waters are shallow, and are discoloured by the yellow mud carried down by the Yellow R.

Yellowstone National Park, U.S.A., U.S. Government Reservation in N.W. corner of Wyoming, projecting about 2 miles into Montana and Idaho. It is less a park than a series of parks formed by different valleys on the two sides of the Rockies. Is subject to great extremes of climate, often freezing at night after scorching days. The whole region is of geologically recent volcanic origin, and the geysers are still active and famous. They are said to number over 10,000, the largest being the Excelsior. The highest peaks in the park are the Washburn, Chittenden, Langford, Doane, Stevenson, Turret, Sheridan, Electric, Baronet, and Norris Mts. The chief lakes are the Four Cantons, Lewis, Heart, and Shoshone. The Yellowstone is the chief riv. The whole region is one of wild and varied beauty and of all sorts of curious thermal phenomena. The first white to attempt an exploration of the region was a trapper named Coulter, who in 1805 traversed a part of this district. His tales were disbelieved, but were confirmed thirty years later by the discoveries of Bridger. In 1870 the first official survey was made, and in 1871 Hayden's famous expedition revealed the glories of the Yellowstone dist. See Hayden's Reports, 1872, etc.

Yellow Wood, a name given to various trees, principally *Cladrastis tinctoria*, a small leguminous tree, sometimes grown in gardens for its spikes of white flowers.

Yemen, an imamate of S.W. Arabia, bounded on the N. by Hejaz and Nejd, on the E. by Hadramaut, and on the S. by the Aden Protectorate, and on the W. by the Red Sea. Sana is the capital. Grain and coffee are the chief productions, there being a sufficient rainfall. Area about 75,000 sq. m. Pop. about 3,500,000.

Yenikale, see KERCH or KERTCH.

Yenisei, a river of Siberia (3000 m. long). Rises in Mongolia, and flows W. as far as the Russian border, and then N. to the Arctic Ocean. Area of basin about 1,000,000 sq. m. Drains the regions of Yeniseisk and S. Irkutsk. Chief tributary the Angara. The chief tn. on its banks is Yeniseisk. The riv. is broad, and spreads out into a large estuary with several wide mouths. It is navigable in summer for 1500 m.

Yeniseisk: (1) A former large prov. of Siberia, between Yakutsk on the E. and Tomsk on the W., now included in the Siberian Region Proper of the Russian S.F.S.R. (2) A tn. on the Yenisei, formerly cap. of foregoing. Has a considerable fur trade, chiefly with China, and a market. Circumference of walls, 3 m. Pop. 5890.

Yeoman, was anciently a forty-shilling freeholder or holder of property worth £2 per annum, and as such qualified to vote and serve on juries. In more modern times it meant a farmer who cultivated his own freehold.

Yeomanry, a Brit. volunteer cavalry force, organised in almost every co. during the period following the Fr. Revolution, a time when the danger of invasion was considered imminent. After 1903 the whole Y. force was absorbed into the cavalry section of the Territorial Force. During the Great War Y. fought on nearly all fronts. After the War many of the Y. regiments were converted into artillery, armoured-car, or infantry regiments, due to the fact that cavalry was considered an arm which found very limited employment in these days of swift armoured cars.

Yeomen of the Guard, an anct. royal bodyguard employed on state occasions as part of the sovereign's retinue. It was founded by Henry VII. in 1485 and its members still retain the costume of the period of their foundation. It is formed of old soldiers of fine appearance and numbers 100 men, and one of their duties at present performed is that of Warders of the Tower of London. They are popularly known as Beef-eaters (*q.v.*). See Sir Reginald Hennell, *History of the King's Body-guard of the Yeomen of the Guard*, 1904.

Yeovil, a mun. bor. and market tn. of Somersetshire, England, on the E. Yeo. The church of St. John the Baptist is a fine cruciform structure with a fifteenth-century tower. Y. is noted for its manuf. of gloves. Pop. (1931) 19,080.

Yeshiva College, the first college of liberal arts and sciences in the U.S.A. under Jewish auspices, for men students only. As the Rabbi

Isaac Elchanan Theological Seminary it was chartered in New York in 1896 and later took over the Etz Chaim Talmudic Academy, then the oldest Jewish day school in the country. In 1928 its charter was amended and the Y. C. became known as the Rabbi Isaac Elchanan Seminary and Yeshiva College and was authorised to offer courses leading to the baccalaureate degrees.

Yessel, see IJSSEL.

Yew, or *Taxus baccata*, a European evergreen tree, with linear leathery leaves and dioecious flowers, followed by bright, rose-red, cup-shaped fruits or arils. The tree attains a very great age; its wood is hard and close-grained, but splits readily. It was formerly used for making long-bows. Its leaves and seeds, but not the fleshy part of the fruit, are poisonous. It is used medicinally in India but not in Britain.

Yezd, a tn. of Persia, 165 m. E.S.E. of Ispahan, the centre of the silk industry of Persia. Y. contains eighteen mosques, one of which, the Masjid i Yama, dates back to 1119. Pop. 50,000.

Yezidis, or Shemsieh Kurds, a religious sect whose chief settlement is in the Sinjar hills, N. of the Mesopotamian plain. They are also found on the Van and Erzerum plateaus, in Persia, and in Transcaucasia, near the E. bank of Lake Gokcha. They hold beliefs derived from Mohammedan and various other sources, and are commonly called 'Devil Worshipers.' Their supreme being is Satan, whom they worship in the form of a peacock, and their great saint Sheikh Adi, whom they pretend wrote a code of doctrine, the so-called Aswad, or 'Black' Book. The Y. are far superior morally to their Nestorian or Gregorian, Shiah, or Sunnite neighbours.

Yezo, Yesso, Ezo, or Hokkaido, the largest of the islands of Japan. Honshiu lies to the S., and Saghalien to the N. Area 30,114 sq. m. The island is partly of volcanic origin. It has many good harbours. The climate is severe, but some farming is carried on. Fishing, lumbering, and mining are the chief industries. Gold, silver, and coal are mined. The primitive Ainos have been some trouble to the Japanese, but are dying out before the advance of Japanese civilisation. A university was established at Sapporo, the cap., in 1918. Hakodate and Otaru are other tns.

Yggdrasil, in Scandinavian mythology, the ash tree which binds together heaven, earth, and hell. Its roots run in three directions: one to the Asa gods in heaven, one to the frostgiants, and the third to the under-

world. Under each root is a fountain of wonderful virtues. In the tree, which drops honey, sit an eagle, a squirrel, and four stags. At the root lies the serpent, Nithhöggr, gnawing it, while the squirrel, Ratatöskr, runs up and down to sow strife between the eagle at the top and the serpent.

Yiddish (Ger. *Jüdisch*, Jewish), a polyglot jargon, used for intercommunication among the Jews. It is really a corrupt form of Hebrew. It is spoken in the East End of London, where two daily papers, the *Jewish Express* and the *Jewish Journal*, are published in this dialect. Y. is also commonly spoken in Central Europe. See Max Grünbaum, *Yiddish Chrestomathy*, and Wiener, *The History of Yiddish Literature in the Nineteenth Century*.

Ymuiden, or Ijmuiden, a seaport of Holland in the prov. of N. Holland, 6 m. from Haarlem. It stands at the end of the North Sea Canal, by which it is connected with Amsterdam. This canal, which is one of the most important waterways of Holland for transmarine traffic, was widened and made deeper in 1911. Pop. 3500.

Yo-chow, a city in the prov. of Hunan, China, at the outlet of Tungting lake. It is a depot for native products destined for export and for foreign goods on their way inland. Pop. 5000.

Yoga, the fourth of the six systems of Hindu philosophy, commonly regarded as a theistic development of the Sankhya, directly acknowledging Ishvara, or a supreme being. Its alleged author is Patanjali, and its aim is to teach the means by which the human soul may attain complete union with the Supreme Soul. See H. Carrington, *Higher Psychical Development (Yoga Philosophy)*, 1921; S. Dasgupta, *Yoga as Philosophy and Religion*, 1924.

Yohimbine, an alkaloid (*q.v.*) of the chemical formula $C_{17}H_{19}N_3O_2$. It occurs in the leaves and bark of the yohimbah tree (*Corynanthe Yohimbe*) and is used, particularly in veterinary practice, as an aphrodisiac.

Yokohama, chief seaport of Japan, on Tokyo Bay in the ls. of Honshiu, with a good and commodious harbour. Y. in 1859 took the place of Kanagawa, which was first appointed as the treaty port on the W. side of Tokyo Bay. Since then the tn. has grown rapidly and has considerable trade. With Tokyo, it was largely destroyed in a great earthquake, 1923, but has been reconstructed. The chief imports are cottons, woollens, metals, sugar, and petroleum; the chief exports silk, tea, copper, and coal. Pop. (1925) 405,888.

Yokosuka, a seaport and naval

station of Japan on Tokyo Bay, 14 m. S.W. of Yokohama. Pop. 89,875.

Yola, a tn. and prov. in N. Nigeria, Africa. The latter has an area of 11,600 sq. m. and an est. pop. of 300,500. The chief crops are cotton, rice and tobacco. The tn. on the R. Benue is the cap. of the prov., and was founded by the Fula conqueror, Adama, about the middle of the nineteenth century.

Yonge, Charlotte Mary (1823-1901), a novelist, b. at Otterbourne. She pub. various historical works, a book on *Christian Names*, a *Life of Bishop Patten*, and a monograph on *Hannah More*; but she is chiefly remembered as the author of *The Heir of Redclyffe*, which she published in 1853. *The Daisy Chain* and *Modern Broods*. See *Life and Letters* by C. Coleridge, 1903.

Yoni, see LINGA PUJA.

Yonkers, a city of Westchester co., New York, U.S.A., on the Hudson R., N. of and adjoining New York City, of which it is a residential suburb. It produces carpets and rugs, and foundry and machine-shop products, besides confectionery, furniture, and hats. Pop. (1930) 134,646.

Yonne, an agricultural dept. of Central France, with an area of 2892 sq. m. It belongs to the basins of the Seine and the Loire, chiefly the former, and has a temperate climate, except in Morvan, where the extremes of heat and cold are greater, and where the rainfall is most abundant. Wheat and oats are the chief cereals, and the vine covers about 6 per cent. of the surface. Cap., Auxerre. Pop. (1926) 277,230.

Yorek (or York) von Wartenburg, Johann David Ludwig, Graf (1759-1830), an officer in the Prussian army, dismissed for insubordination (1778); he served in Holland for a time, returning to Prussia in 1786. Y. won distinction in the Polish campaign (1794), and commanded the Prussian troops of Napoleon's 'Grande Armée' (1812). After Prussia's withdrawal from the Fr. cause, he fought at Dannekow, Wartenburg, Möckern, Leipzig, Montmirail, and Laon (1813-14), and was created field-marshal (1821).

York: (1) A city and co. bor. of England, cap. of Yorkshire, seat of an archbishopric, on R. Ouse, 175 m. N.N.W. of London. Was a British and a Rom. city, being known to the Romans as Eboracum. Constantine the Great was probably b. there. Has always held a high position among Eng. tns., and contains many historic buildings, including the Minster, founded 626; the present nave was built in 1291, and this cathedral is the finest Gothic building in the world;

the churches of St. Michael-le-Belfry and St. Martin in the Late Perpendicular style; the anct. Guildhall, etc. Y. still remains an important residential and ecclesiastical centre. There are many manufs., and a still flourishing market. Pop. (1931) 84,810. See C. R. Swift, *Everyman's York*, 1927. (2) A city and co. seat of York co., Pennsylvania, U.S.A., on the Condorus Creek, 28 m. from Harrisburg. It has numerous manufs. and is the trade centre for a rich agricultural region. Pop. (1930) 55,254. (3) A mun. tn. of Western Australia, 77 m. E. of Perth. It is in a dist. which is the principal source of the sandal-wood supply. Pop. 4000. (4) Co. seat of York co., Nebraska, U.S.A., on the Big Blue R., 50 m. W. of Lincoln. It is the seat of York College, is a stock-raising centre, and has manufs. of flour. Pop. (1930) 5712. (5) A riv. in Virginia, U.S.A., formed by the confluence of the Pamunkey and Mattaponi Rs. It is the tidal estuary of the rivs., which begins at West Point and flows S.E. to Chesapeake Bay.

York, Prince Albert Frederick Arthur George, Duke of, b. Dec. 14, 1895, at York Cottage, Sandringham; second son of King George V. Educated: Royal Naval Colleges, Osborne and Dartmouth; Trinity College, Cambridge. Present at Battle of Jutland, 1916. On staff of Commander-in-Chief, Portsmouth, 1916-17. Lieutenant, R.N., 1918. Made Baron Killarney, Earl of Inverness, and Duke of York, June 3, 1920. Married in Westminster Abbey, April 26, 1923—see YORK, DUCHESS OF. P.O., 1925. A Counsellor of State during King's illness, 1928-29.

York, Elizabeth Angela Marguerite, Duchess of, b. Aug. 4, 1900; youngest daughter of Sir Claude George Bowes-Lyon, fourteenth Earl of Strathmore and Kinghorne, by his countess, Nina Cecilia, daughter of Rev. Chas. Cavendish-Bentinck, a son of the third Duke of Portland. Married, April 26, 1923, Prince Albert Frederick Arthur George, Duke of York: of which union there is issue—Princesses: Elizabeth Alexandra Mary, b. April 21, 1926; Margaret Rose, b. Aug. 21, 1930.

York, House of, a branch of the Eng. royal dynasty of Plantagenet, descended from Lionel, Duke of Clarence, third son of Edward III., and Edmund, Duke of York, fifth son of Edward III. The head of the house was Richard, Duke of York, who was killed in the Battle of Wakefield, 1460. His sons, Edward IV. and Richard III., and grandson, Edward V., were kings of England, 1461-85. The descendants of Edward IV.'s brother

(Duke of Clarence) and sister (Elizabeth) became claimants after 1485. The last serious claimant was Richard de la Pole (*d.* 1525). The title, Duke of York, is now generally borne by the second son of the reigning monarch. Henry VIII. and Charles I. both held the title previous to the death of their elder brothers, and James II. also was Duke of York before his accession to the throne, as was his present majesty, King George V., before he became Prince of Wales.

York and Lancaster Regiment, a British regiment, formerly 65th and 84th Regiments. 65th raised 1756 as 2nd Battalion, 12th Foot (Suffolk Regiment), made a separate corps 1758, and went to W. Indies, thence to America for the War of Independence. Later again went to W. Indies and participated in capture of Martinique and Guadaloupe, thence to the Cape and India, where it did good work in several wars. 84th raised 1793: its early service was at the Cape and in India and later in the Peninsula. Served with distinction during Indian Mutiny and at Tel-el-Kebir. Both regiments were linked in 1881. During the Great War raised twenty-two battalions and served in France, Flanders, Italy, Macedonia, Gallipoli, and Egypt.

Yorke, Philip, *see* HARDWICKE, PHILIP YORKE, first EARL OF.

York Plays, *see* MIRACLE PLAY.

Yorkshire, a N.E. maritime co. of England; bounded on the N. by Durham, S. by the shires of Lincoln, Nottingham, and Derby, E. by the North Sea, and W. by Lancashire and Westmorland. It is the largest co. in England, and is divided into three Ridings, N., E., and W., each forming a separate administrative co. The coast-line is fairly even, with cliffs of an average height; the largest indentation is that formed by the mouth of the Humber, which separates Y. from Lincolnshire, others being Bridlington, Filey, and Robin Hood bays, and the mouth of the Tees, which separates it from Durham. At Boulby the cliffs reach a great height (666 ft.), and again at Flamborough Head; between this point and Spurn Head at the mouth of the Humber, the other principal headland, the coast is low. The surface of the co. is varied, being mountainous and moorland in the N. and W., while the centre is a vast plain, the plain of York; among the mountains are beautiful valleys or dales, the principal being Teesdale, Wensleydale, and Airedale. In the W. is the Pennine Range, reaching an elevation of 2591 ft. at Mickel Fell in the extreme N.; in the N.E. are the Cleveland and Hambleton

Hills, and in the E. are the Wolds. The prin. rivs. are the Ouse (which with the Trent forms the estuary of the Humber, and is itself formed by the junction of the Swale and the Ure) and its tributaries the Wharfe, Aire, Nid, and Don, with the Derwent on the E. In the N. are the Esk and the Tees, and in the W. the Ribble. On the coast are a number of well-known watering-places, of which the most important are Scarborough, Whitby, Bridlington, Filey, and Saltburn-by-the-Sea. Scarborough is famous for its Spa, as is also Harrogate, and there are mineral springs at several other places. Y. possesses valuable coalfields in the W. Riding; in the N. Riding iron ore is obtained in large quantities (over 2,000,000 tons of pig-iron being obtained in the Cleveland dist. yearly), and lead, slates, limestone, flagstones, and fireclay are also worked. The E. Riding is the great agricultural dist. Oats and barley are the main crops, with turnips and swedes; flax and liquorice are also grown. Sheep farming is carried on largely in the N. and W. Ridings; the latter is famed for its cattle, the former for its horses. Pigs are kept in large numbers, bacon being a speciality. Dairy farming flourishes, cheese making being an important branch, and hunters and carriage horses are bred. The great manufacturing centres are in the W. Riding; woollen and worsted goods rank first at Leeds, Bradford, Halifax, Huddersfield, etc.; iron and steel goods come next, with their centre at Sheffield, which is especially noted for plate and cutlery; leather is manufactured at Leeds, and there are chemical works, paper making, etc., among the lesser industries. Ship-building is carried on, notably at Whitby, and there are important fisheries. Communication is excellent; besides the railways there is a system of canals which connects with the sea, the prin. ports being Middlesbrough on the Tees, Hull on the Humber, and Goole on the Ouse. The co. returns, excluding co. bors., twenty-six members to parliament. York is the co. tn.

There are some British earthworks and barrows in Y., and it was occupied by the Romans for about 400 years after A.D. 50; many traces of their occupation still survive. Y. formed part of the anct. kingdoms of Deira and Elmet, was conquered by the Danes in 875, and came under the rule of Harold of England in 1066 after the Battle of Stamford Bridge. It was devastated by the Normans. Since that date the co. has been the scene of many battles; in 1138 the Scots were defeated at

the Battle of the Standard, Northallerton; in 1322 Edward II. defeated the barons at the Battle of Boroughbridge; in 1399 Richard II. was murdered at Pontefract Castle; in 1453 the Wars of the Roses commenced with the fight at Stamford Bridge; and in 1460 the Duke of York met his death at Wakefield. During the Civil War the co. was divided, and the prin. battle was that of Marston Moor, when the Royalists were defeated. Y. is rich in antiquities; among the numerous castles the best known are those of Pontefract, Knaresborough, Richmond, Scarborough, and Skipton. Bolton Castle was one of the many prisons of Mary, Queen of Scots; Carwood Castle was once the palace of the archbishops of York, and a residence of Wolsey; Conisborough Castle and Jervaulx Abbey have been immortalised by Sir Walter Scott in *Ivanhoe*; and there are others too numerous to mention. Of the ecclesiastical remains the most important are the abbeys at Bolton and Fountains, the Benedictine abbey of St. Mary at York, and the Cistercian abbey of Rievaulx; there are many others, besides a number of beautiful churches, of which the Minster at York (*q.v.*) is the finest.

In no county was the transition from old to new at the Industrial Revolution so marked as in Y. The change was first made with the introduction of machinery in agriculture. The Plain of York, watered by the Ouse and its tributaries, has always retained its prominence in agriculture, but with steam-driven machinery the W. Riding became a manufacturing centre where conditions during the Industrial Revolution entailed much suffering. Yorkshiremen, such as Wilberforce, Richard Oastler, and Michael Thomas Sadler, were in the forefront of the movement for reform. The earliest factories were driven by water and were built in the Pennines. Later, however, with steam power they were concentrated in the towns, and subsequent to 1870 the W. Riding, being the most thickly populated owing to industrialism, has been fortunate in the growth of facilities for education. Universities were founded at Sheffield and Leeds, and in respect to adult education it is estimated (Board of Education Report, 1928) that about one-sixth of the total number of students in England and Wales (some 60,000) are Yorkshire people. In pop. Y. represents about one-tenth of the total pop. of England and Wales. The area is 3,888,237 acs. (E. Riding, 750,115 acs.; N. Riding, 1,362,058 acs.; W. Riding, 1,776,064 acs.); and the pop.

(1931) is 4,068,202 (E. Riding, 483,058; N. Riding, 232,936; W. Riding, 3,352,208).

See *Victoria County History: Yorkshire*; J. S. Fletcher, *Picturesque History of Yorkshire*, 1904; A. H. Norway, *Highways and Byways in Yorkshire*, 1899; F. R. Pearson, *Yorkshire*, 1928; H. L. Gee, *The Romance of the Yorkshire Coast*, 1928; H. Sutcliffe, *The Striding Dales*, 1929.

Yorkshire College, see LEEDS.

Yorkshire Electric Power Co. (registered offices: 36, Park Place, Leeds), supplies in perpetuity electricity for power or light to local authorities and the public over an area of about 1800 sq. m. Its generating stations are at Thornhill, Ferrybridge, and it leases the station of the Yorkshire Waste Heat Co., Ltd., at Barugh (whose share capital it holds), with a total capacity of nearly 90,000 kw. Authorised share capital \$6,000,000; issued and paid up \$4,123,000. Dividends for eleven years to 1929, 8 per cent. each year.

Yorkshire Light Infantry (King's Own). The famous 'Koylis' were formerly 51st and 105th Regiments. 51st raised 1755 and gained early distinction at Minden. Sir John Moore, of Corunna fame, commanded in 1794, and the regiment took part in the retreat and several of Wellington's great battles in the Peninsula and at Waterloo. Further service was seen in Burma War and later in Second Afghan War of 1878-80. 105th raised 1839 in India as 2nd Madras European Light Infantry and served in Madras and Burma. After Indian Mutiny it was transferred to the British Line as 105th. Regiments were linked in 1881. During Great War raised twenty-six battalions and served in France, Flanders, Italy, Macedonia, and Egypt.

Yorkshire Regiment (The Green Howards, Alexandra, Princess of Wales's Own Yorkshire Regiment), a British regiment, formerly 19th Foot, raised 1688. Served under Marlborough at Malplaquet. From 1738 to 1748 Hon. Charles Howard was colonel and facings were green, whence 'Green Howards' to distinguish it from other regiments with Howards as colonels. Further service was in Flanders, Belle Isle, America, India, Ceylon, W. Indies, and N. America, then to Crimean War. Honours were also gained in Tirah and S. African campaigns. During Great War raised twenty-four battalions and served in France, Flanders, Italy, Gallipoli, Egypt, and N. Russia. Served in Third Afghan War, 1919.

Yorkshire Regiment, East, a British regiment, formerly 15th Foot, another famous old corps, raised 1685. Gained

great distinction under Marlborough at Blenheim, etc., and under Wolfe at Louisbourg and Quebec. Saw much service in W. Indies and participated in capture of Martinique, Havannah, St. Lucia, and Guadeloupe. On the other side of the world it went through Second Afghan War with Lord Roberts. During Great War raised twenty-one battalions and served in France, Flanders, Macedonia, Gallipoli, and Egypt. H.R.H. Duke of York is colonel-in-chief.

Yorkshire Regiment, West (The Prince of Wales's Own), a British regiment, formerly 14th Foot, raised 1685. This famous old corps served under William III. at Namur (1695) and later at Gibraltar. From 1766 to 1778 it served in W. Indies and America. Distinguished itself at Farnars, 1793, with which its regimental march 'Ca Ira' is associated, and the next year at Tournay. Took part in Moore's retreat on Corunna, at Wellington's victory at Waterloo, capture of Bhurtপুর, 1825, Crimean, Afghan, and S. African Wars. During Great War raised thirty-one battalions and served in France, Flanders, Italy, Gallipoli, and Egypt.

Yorkshire Terrier, a small, long-coated dog, with straight, silky hair reaching to the ground from the back of the head to the tail and parted in the middle of the back. It is blue-grey, with tan on the head, ears, and legs. The ears are small, V-shaped, and carried semi-erect; the body is compact and level on top of the back. The weight is about 5 lb. It needs daily grooming, the coat being brushed straight down each side.

Yorktown, a tn. and co. seat of York co., Virginia, U.S.A., on the York R. Here the last important battle of the Revolutionary War was fought in 1781, when Lord Cornwallis surrendered to Washington. Pop. 480.

Yoruba, or **Yarriba**, a fertile and densely populated region of W. Equatorial Africa, included in the British colony of S. Nigeria. It lies S.W. of the Lower Niger (Quorra), adjoining Dahomey on the W. and Nupe on the N.E., and reaching from Borgu nearly to the Bight of Benin. Among the chief tns. are Ibadan (chief commercial centre), Oyo (cap.), and Abeokuta (cap. of Egba prov.). Agriculture and cattle-rearing are carried on. Area about 18,500 sq. m. Pop. about 2,000,000. The people are negroes of some culture. The Mohammedan Fulahs captured Ilorin and destroyed the old native Y. kingdom (1820). See Ellis, *The Yoruba-speaking Peoples*, 1894; Gouzien, *Manuel Franco-Yoruba de Conversation*, 1899.

Yosemite Park, Central California, a national park embracing the

Yosemite Valley, U.S.A. The region is composed of granite, and the riv. valley is extremely beautiful, with all kinds of flowering plants and tall trees for the 6 m. of its length. The Nevada Falls are among the finest in the world. Discovered in 1851 by Bolling and his soldiers, who were fleeing from pursuit by Indians, it was made a national park by Act of Congress in 1864. It is still inhabited by a few Indians. See Whitney, *The Yosemite Book*, 1868.

Yoshito Harunomiya, Japanese Emperor (1879-1926), see JAPAN—History.

Youghal, a municipal bor., market tn., and seaside resort of Cork co., Munster, Irish Free State, on the W. side of the Blackwater estuary, about 27 m. E. of Cork, of which it is a sub-port. It contains St. Mary's church (eleventh century), a college founded in 1464, Raleigh's house, and other interesting buildings. There are salmon-fisheries and exports of corn and live stock. Bricks, earthenware, and fine point-lace are made. Pop. (1926) 5340.

Young, Arthur (1741-1820), an Eng. agriculturist, was a practical farmer and wrote many books on agricultural and political subjects. His works include: *The Farmer's Letters to the People of England*, 1767; *Observations on the Present State of the Waste Lands of Great Britain*, 1773; *Political Arithmetic*, 1774; *A Tour in Ireland*, 1780, written after two years' experience as agent to Lord Kingborough in co. Cork; the voluminous *Annals of Agriculture* (1784-1809), and the well-known *Travels in France*, 1792. He was elected a fellow of the Royal Society in 1773, and appointed in 1793 secretary to the Board of Agriculture. There is an *Autobiography*, ed. by M. Betham-Edwards (1898).

Young, Brigham (1801-77), an American, president of the Mormon Church. He joined the sect in 1832, soon rose to importance, and succeeded J. Smith as prophet and president (1844). Under his leadership the Mormons, when driven from Nauvoo, finally settled in Utah, founding Salt Lake City (1847). Y. proclaimed the doctrine of polygamy (1852), and his power declined when this was abolished by the gov. (1869). See *Mormons*, by Mackay (1851), Gunnison (1852), Hyde (1857), Stenhouse (1873), Kennedy (1888).

Young, Edward (c. 1683-1765), an Eng. poet, educated at Winchester College and Oxford. Y. entered holy orders (1727) and became rector of Welwyn, Hertfordshire (1730). His most famous poem, *The Complaint, or Night Thoughts* (1742-46), was inspired

by the death of his wife, Lady Elizabeth Lee. The work abounds in hyperbole and antitheses, but was much admired. There are Ger. translations by Ebert (1760-71), Bentzel-Sternau (1825), and Von Hohenhausen (1844). Other works include the tragedies *Busiris* (1719) and *The Revenge* (1721); *The Love of Fame, the Universal Passion* (1725-28), in verse; and *The Centaur not Fabulous* (1758), in prose, both satires; his collected *Works* were pub. 1757. See ed. with biography by Doran (1854). *Consult* Mitford's *Life* (1854); Thomas, *Le Poète E. Young*, 1901; Kind, *E. Young in Germany*, 1906.

Young, James (1811-83), a Scottish chemist, assisted Thomas Graham at the Andersonian Institution, Glasgow (1832), and later at University College, London. He became manager of Messrs. Muspratt's chemical works at Newton-le-Willows (1839), and of Messrs. Tennant's at Manchester (1844). In 1847 he began his analyses of petroleum, and succeeded in producing a lubricating oil for machinery and a lighter oil for lamps. In 1850 Y. took out a patent for the dry distillation of coal, and thus obtained various oils and paraffin. Works were erected at Bathgate and Addiswell, and in 1866 a limited company was formed. Y. did much to develop the American petroleum industry. Lyon Playfair and David Livingstone were both his friends, and he sent an expedition in search of the latter (1872).

Young, Owen D., American lawyer and financial expert; b. Oct. 27, 1874, at Van Hornesville, N.Y.; son of Jacob Smith Y. A.B., St. Lawrence University, N.Y., 1894; LL.B., Boston University, 1896. Practised in Boston, 1896-1913; member of Tyler and Young. Then counsel to General Electric Co.; chairman of board from 1922. Member, first Committee of Experts appointed by Reparation Commission; adviser, London Conference of Premiers; and *ad interim* Agent-General for Reparation Payments, 1924. Chairman, second Committee of Experts, 1929. See **YOUNG PLAN**.

Young, Thomas (1773-1829), an Eng. physician, physicist, and Egyptologist, b. at Milverton, Somersetshire. Studied in London, Edinburgh, and Göttingen. He settled in London as a physician, and continued to practise till his death. He devoted himself to the study of natural philosophy, and wrote papers *On Vision*, and *Outlines of Experiments and Observations respecting Sound and Light*. The subject was resumed in his other papers, *The Theory of Light and Colours* (embrac-

ing the fact of the interference of light, then first made known), and *Experiments and Calculations relating to Physical Optics*. In 1807 he published his *Lectures on Natural Philosophy*. He became secretary of the Board of Longitude in 1818, and conductor of the *Nautical Almanac*. Y. also did much work in the interpretation of Egyptian hieroglyphics, and was the first to translate the inscription on the Rosetta Stone.

Young England, a section of the Eng. Conservative party which about 1842 began a movement whose spirit and aim are well shown in Disraeli's *Coningsby*. The author of this novel and Lord John Manners, Duke of Rutland, were the chief leaders of the movement, which aimed at a revival of the mediæval relations between the upper and lower classes, as an antidote to the rapid spread of democratic principles.

Younghusband, Sir Francis Edward, Anglo-Indian official and traveller; b. May 31, 1863, at Marri, Punjab; second son of Major-General John W. Y. Educated: Clifton; Sandhurst. Joined 1st Dragoon Guards, 1882; captain, 1889. Transferred to Indian Political Department, 1890. Explored Manchuria, 1886; travelled, Peking via Chinese Turkestan to India, 1887. Political agent, Chitral, 1893-94. Special correspondent of *The Times*, Chitral Expedition, 1895. Transvaal and Rhodesia, 1896-97. Resident, Indore, 1902-03. Commissioner to Tibet, 1902-04—K.C.I.E. Resident, Kashmir, 1906-09. K.C.S.I., 1917. President, Royal Geographical Society, 1919. Books include: *Kashmir*, 1909; *India and Tibet: Within*, 1912; *Dawn in India*, 1930.

Young Ireland, an Irish political party which arose during the eighteenthforties when the agitation for Irish Home Rule became intense. Its aim was to unite the Catholics and Protestants of Ireland in a final attempt to sever the union with England. Its chief leaders were Thomas Davis, Gavan Duffy, John Mitchell, John Dillon, and William Smith O'Brien.

Young Men's Christian Association (Y.M.C.A.), an association for banding young men together in an effort to improve themselves, spiritually, intellectually, and physically, founded in Eng. in 1844 by (Sir) George Williams, then a clerk in a drapery establishment. The room in which he held his first meeting with eleven others is known as the 'upper room' and remains intact, and a replica of it has been arranged in America by the U.S. Association. The movement thus started spread rapidly throughout London and the provs., and under a slightly different form in America.

As its aims grew more ambitious, and its range greater, more organisation was necessary, and the first great international convention was held at Paris in 1855. Its greatest expansion followed its activities on the outbreak of the Great War. Since that time it has more than doubled its membership and the volume of its work. During the War it had centres in all fields of hostilities and in the home camps. In these centres, which were known as recreation huts, concerts were organised, refreshments provided, stationery supplied free, and free meals given to all walking wounded at centres and clearing stations. In recognition of the beneficent work done by the association during that period the then national secretary, A. K. Yapp, was created a K.B.E. Sir George Williams, who *d.* in 1905, was buried in St. Paul's Cathedral, where his bust is to be seen in the crypt, while the association is further honoured by a memorial window in Westminster Abbey. At the beginning of 1932, the total associations numbered 10,614, with a membership of 1,691,646. Of these associations, 814 were in Great Britain and Ireland, whose membership was close upon 118,430, while the U.S.A. had 1435 centres with a membership of 1,011,144. In Canada there are 75 centres with a total of 48,522 members. In the U.S.A., the Y.M.C.A. has net property and funds aggregating 239,114,000 dollars and expenditures are 59,273,600 dollars. In Canada, the Y.M.C.A. owns 7,908,700 dollars' worth of property and spends 2,190,800 dollars.

Young Plan, the plan for payment of Ger. reparations which superseded the Dawes Plan (*q.v.*). It was drawn up in 1929 by an international committee of experts, chief among whom was Mr. Owen D. Young of the U.S.A. It provides for a series of annuities to be paid by Germany, through the Bank for International Settlements, with the regularity of coupons of ordinary commercial bonds, the sources of these annuities being the German Railway and the budget of the Reich, the total Ger. indebtedness being reduced by £25,000,000. The scale of annuities is 1707.9 million R.M. in 1930, increasing, over a period of thirty-six years, to 2428.8 million in 1965, and thereafter decreasing from 1607.7 million in 1966-67 to 897.8 in 1987-88. As contrasted with the Dawes Plan, it indicates a definite number of fixed annuities instead of payments depending on prosperity, and, instead of providing any measure of external control, it gives financial autonomy

to Germany. With its rising series of annuities, the Y. P. contemplated the steady expansion of world trade both in value and in volume, in which the annuities would become a factor of diminishing importance. In fact the opposite proved to be true. A great part of Germany's income from her surplus of exports was absorbed by the amounts earmarked for the interest and normal amortisation of her foreign liabilities, and for reparations payments, prior to the operation of the moratorium under the Hoover Plan. It soon became evident that Germany was justified in declaring, in accordance with her rights under the Y. P., that in spite of her efforts to stabilise her currency, she would be unable to meet her obligations under the Y. P. in the year beginning July 1932. See further under REPARATIONS and also INTERNATIONAL SETTLEMENTS, BANK FOR. Consult Report of the Committee of Experts on Reparations, 1929 (Cmd. 3343); Report of Special Advisory Committee under the Agreement with Germany of Jan. 20, 1930 (Basel, Dec. 23, 1931) (published in Great Britain as Cmd. 3995, 1932).

Youngstown, co. seat of Mahoning co., Ohio, U.S.A., on Mahoning R., 65 m. S.E. of Cleveland. It has coal, iron, and lumber industries, foundries, blast-furnaces, and machine shops. Pop. (1930) 170,002.

Young Turk Party, see TURKEY.

Young Women's Christian Association (Y.W.C.A.), an association formed in 1855 on the lines of the Y.M.C.A. to promote the social, physical, intellectual, and spiritual welfare of girls. It was reorganised on a universal basis in 1894, and now includes a number of associations, each having its headquarters in a separate country. The British association is divided geographically into several divisions. It has 350 centres, a membership of 35,000, and an ordinary income of £33,000. Its activities include clubs, hostels (with accommodation for 5000 girls), and training and educational facilities, with a view to employment both in the United Kingdom and overseas. A feature of the association's work is the organisation of camps and holiday homes. Under the direction of the International Service Committee of the Y.W.C.A. are the International Centre of the Y.W.C.A. and Amies de la Jeune Fille (1875), which exist to protect and help young women and girls of all creeds and nationalities through clubs, hostels, and employment agencies. Also under the association's auspices is the Travelers' Aid Society (founded 1885), which protects girls travelling in

search of employment. The London division of the Y.W.C.A. (Regent Street) has (1931) over 6000 members and an income (1929) of £70,000.

In the U.S.A. there are over 1100 associations, of which 1000 are affiliated to the national organisation. The total membership of the affiliated associations is nearly 600,000 girls and women, and the annual expenditure some 25 million dollars. The national executive organisation is known as the National Board of the Y.W.C.A. and holds a convention every two years. The educational classes and the clubs for recreation and study are a feature of the association. The employment bureaus of the association find work for large numbers of girls; while the residences, which number about 250, house some 600,000 women and girls annually. The national organisation supervises and assists about forty Y.W.C.A. centres in twelve foreign countries and enjoys an income from contributions from affiliated associations of nearly one million dollars. The National Board works through regional offices in Chicago, Denver, and San Francisco, and its headquarters are at 600 Lexington Avenue, New York City, while adjoining is the Y.W.C.A. National School for Professional Study.

Ypres (Flemish *Yperen*, *Yper*), a fortified tn. of W. Flanders prov., Belgium, on the Yperle. It was famous in the Middle Ages. Its many fine mediæval buildings, the markets, including the famous Cloth Hall (1201-1342), St. Martin's Church (thirteenth century), the Gothic meat-market, Renaissance town hall, and Templars' houses were destroyed during the Great War. Its woollens were noted in the fourteenth century, but the chief manufs. are now laces, linen, and thread. Pop. 13,910. See B. Price, *Ypres—Outpost of the Channel Ports*, 1929.

Ypres, Battles of (1st Battle, Oct. 19–Nov. 22, 1914; 2nd Battle, April 22–May 25, 1915; 3rd Battle, July 31–Nov. 10, 1917). Many of the most important actions of the Great War took place in the Ypres sector, which was held continuously by British troops. Gun-fire and shells soon reduced the tn. to ruins. The British occupied the place in the middle of October, 1914, and the first battle lasted for a month, the Gers. making great efforts to recover the prestige they lost at the Marne. On Oct. 31, the Worcestershire Regiment greatly distinguished itself by defeating overwhelming numbers of Gers. who almost broke through at Gheluvelt, thereby saving the Channel ports (q.v.) from capture.

They did, however, establish themselves in several villages in the sector. The second battle commenced in the spring of 1915 by the British capturing Hill 60 (q.v.) after it had been heavily mined. The Gers. counter-attacked furiously, using poison-gas for the first time. Their much-advertised objective was Calais, and the success of their attack with gas gave them hope of attaining it. They broke the Fr. line N. of Ypres, but were checked by the end of April. During May they launched heavier and heavier attacks with gas and gained ground, recapturing Hill 60



[D. McLeish

THE RUINED TOWER OF THE FAMOUS CLOTH HALL AT YPRES

and pushing back the British in the regions of Roulers railway and Menin road. At the end of the battle the British were still holding Ypres, although the Gers. had made some small gains at great cost to themselves. The third battle opened on July 31, 1917, with an attack by the British on a 15-m. front which was very successful. On Aug. 16, another attack on a 9-m. front N. of the Menin road resulted in the capture of Langemarck, and the Fr. on the left also made progress. A few days later the advance was continued in a N.E. direction with further success. On Sept. 20, another attack was launched up the Menin road, and this time the Gers. counter-attacked, but were repulsed. The last phase of this battle was the capture of the Passchendaele ridge by the Canadians in October; heavy fighting followed which resulted in the British gaining some more ground. See also FRANCE AND FLANDERS, GREAT WAR CAM-

PAIGNS IN; WAR, THE GREAT; MENIN GATE; NEUVE CHAPELLE; PASSCHENDAELE.

Ypres, Sir John Denton Pinkstone French, first Earl of (1852-1925), British Field-Marshal; *b.* Sept. 28, at Ripple, Kent; only son of Commander John Tracy William French, R.N.—of the Frenchs of French Park, co. Roscommon. Educated: a preparatory school at Harrow; Eastman's Naval Academy, Portsmouth. He joined H.M.S. *Britannia* in 1866, and served in the royal navy for four years. He was commissioned in the 8th Hussars, 1874, soon transferring to the 19th; took part in the Sudan campaign, 1884-85; and was present at Abu Klea, Gubut, and Metamnah. Captain, 1880. Major, 1883. Colonel, 1889. In 1899 he was appointed major-general to command the cavalry division in Natal, and won the Battle of Elands-laagte. He commanded the cavalry in Sir George White's forces at the battles of Reitfontein and Lombard's Kop. K.C.B., September 1899. In command of the troops engaged round Colesberg, 1899-1900; of the cavalry which relieved Kimberley, February 1900, and which compelled Cronje to surrender at Paardeberg; and of the artillery and horse-forces in the operations which ended in the capture of Bloemfontein and Pretoria. He commanded the left wing of Lord Roberts's forces at the Battle of Diamond Hill, June 11-12, and the forces which captured Barberton. On the appointment of Lord Kitchener to supreme command in November, F. was appointed to the command in the Southern Transvaal, and took part in the operations against the rebels in Cape Colony until the end of the war. He commanded the 1st Army Corps at Aldershot, 1901-07. Lieut.-general and K.C.M.G., 1902. In 1907, full general and inspector-general of the forces. Made field-marshal, June 1913. The undertaking given April 1914 by the Secretary of State that Curragh troops should not be used against Ulster was initiated by French; who, on its repudiation by the cabinet, resigned. Commander-in-Chief, British Expeditionary Force, at beginning of Great War. First took part in retreat, afterwards in Battle of the Marne, September 1914. Transferred to Flanders, fighting around Ypres, October to November. Attempted, February 1915, at Neuve Chapelle, to pierce Ger. lines. Next engaged in second Battle of Ypres. At Loos in September again unsuccessful in attempt to pierce Ger. lines. Recalled, made Viscount French of Ypres, and of High Lake, co. Ros-

common, Jan. 1, 1916; and given command of all forces in United Kingdom. Lord-Lieutenant of Ireland, May 1918 till May 1921. Made Earl of Ypres, June 5, 1922. Died at Deal Castle, May 22.

Ypsilanti, a city of Washtenaw co., Michigan, U.S.A., on the Huron R., 29 m. S.W. of Detroit: the seat of the State Normal College. Manufs. paper and cement, machinery and flour. Pop. (1930) 10,143.

Ypsilanti, or Hypsilanti, a noble Gk. Phanariot (Fanariot) family of the eighteenth and nineteenth centuries, who claimed descent from the Comneni, and rose to great power in Constantinople. Among the chief members were: (1) *Alexander Ypsilanti* (1725-1805), a statesman and soldier, hospodar of Wallachia (1774-82, and from 1790 to 1792), and dragoman of the Porte. He was killed by the Turks on a charge of treason. (2) *Constantine*, his son (*d.* 1816), was also hospodar of Moldavia (1799) and Wallachia (1802-05). Deposed (1805), he fled to Russia, and next year at Bucharest again tried to liberate Greece, but was unsuccessful. (3) *Alexander*, son of above (*c.* 1792-1828), was a patriot who fought in the Greek War of Independence. He served in Russia (1812-13), was chief of the Gk. 'Hetairists' (1820), but misused his power, and after a crushing defeat at Dragashan (1821) surrendered to the Austrians, was imprisoned for years, and *d.* in Vienna. See *La Garde-Chambronnas, Souvenirs*. (4) *Demetrius* (1793-1832), his brother, helped to capture Tripolizza (1820), checked the Turks by his defence of Argos, and resisted Ibrahim at Napoli (1825). He tried to emancipate the Christians in Turkey, and was appointed Gk. commander-in-chief in E. Hellas (1828-30) by Capo d'Istria. The city in Michigan, U.S.A., was named after him (1825). (5) *Nicholas*, another brother, left *Mémoires*, edited by Kamboroglous (1901). See *Philemon's Δοκίμιον ιστορικόν* (1859), and W. A. Phillips's *War of Greek Independence* (1897).

Ysaye, Eugene (1858-1931), Belgian violinist and composer, *b.* July 15, of Walloon stock. He began to learn the violin from his father at the age of five. Entered Liège conservatoire and studied under Wieniawski; he attracted the attention of Vieuxtemps, a violinist of world-wide fame, who secured for him a gov. grant to perfect his study. As a young virtuoso, he subordinated both the composer's intentions and classical traditions to the expression of the appeal made by the music to himself as an individual. In 1886, was professor at the Brussels

conservatoire, and in 1889 made his first appearance in London. The Sonata by Lekeu (*q.v.*) (dedicated to him) owes its fame to Y.'s interpretation; other pieces, for the playing of which he is remembered, are a sonata by Lazzari, and, especially, the works of César Franck, Bach, Corelli, Vitali, and Geminiani. On the Ger. invasion of Belgium, in 1914, he took refuge in England, and later went to America, becoming conductor of the Cincinnati Orchestra. Returned to Europe in 1922, but in failing health. Had his right leg amputated in 1929, in which year was produced his opera *Peter the Coalminer*, with librettos written by himself. Died May 12.

Yser, Battle of. The R. Yser rises in N. France and enters the sea at Nieuport, Belgium. When the Gers. overran Belgium at the outset of the Great War the Belgian army withdrew along the coast towards France. On Oct. 25, 1914, this force was holding the line on the Yser from Nieuport towards Dixmude. Gers. attacked on 30th and gained much ground, but were checked by the Belgians opening the sluices of the Yser. See under WAR, THE GREAT.

Ystad, a seaport of Malmöhus län, Sweden, on S. Baltic coast, with a good artificial harbour. It manufs. machinery, tobacco, matches, and chicory, and has shipbuilding yards. Pop. (1929) 11,554.

Ytterbium, symbol Yb, atomic number 70, atomic weight 173.5, a rare-earth element. Marignac in 1878 obtained what he thought was pure Y. in certain minerals, *e.g.* gadolinite. Urbain and von Welsbach, 1907-08, split this up into lutecium and neo-ytterbium (*i.e.* what is now called Y.). Y. forms an oxide Yb₂O₃ and several salts such as the sulphate Yb(SO₄)₂.

Yttrium, symbol Yt, atomic number 39, atomic weight 88.92, a rare metallic element allied to aluminium. It yields colourless salts, and forms an oxide, Yt₂O₃. Although not a rare-earth metal, it resembles that group.

Yü (d. 2197 B.C.), a Chinese emperor, the last of the three famous 'ancient kings' of great virtue, the others being Yao and Shun. He constructed many valuable defences against flood. His reign, which began in 2205 B.C., marks the beginning of the first, or Hsia, dynasty.

Yuan Shih-kai (1859-1916), Chinese statesman; b. Sept. 16, at Hsiang-Cheng, in Honan. In 1882 he went to Korea, becoming Chinese imperial resident at Seoul, the cap., in 1884. He was expelled at the time of the Chino-Japanese War in 1893. In 1897 he was appointed judicial com-

missioner of Chi-li; in 1899 Junior Vice-President of the Board of Works; in 1900 governor of Shantung; and in 1901 viceroy of Chi-li. He was director-general of the northern railways, and consulting minister to the Government Council in 1902; minister of the Army Reorganisation Council in 1903; president of the Board of Foreign Affairs, and grand councillor, 1907; and 'senior guardian of the heir apparent' in 1908. When the revolution broke out in 1911, he became president of the council of ministers, and was Premier for a short time. On Feb. 15, 1912, he was elected provisional President of the Chinese republic; and on Oct. 6, 1913, he was elected President. He was endowed with almost autocratic power: it seemed in Nov. 1915 that he would become Emperor, and his coronation was fixed for Feb. 9, 1916; but discontent began, the South revolted, and the great disorder still reigning (1932) in China set in.

Yucatan: (1) A peninsula of Central America, in S.E. Mexico. Length, 400 m.; mean breadth, 200 m.; coastline, 700 m.; area, 55,400 sq. m. The coast on the N. and W. is low and sandy, but higher and more indented on the E. The dist. contains many relics of the Maya civilisation. (2) A state of the S.E. part of Mexico, being one of the states forming the Yucatan Peninsula. Bounded on the N. by the Gulf of Mexico, E. by the territory of Quintana Roo, S. by the foregoing territory and the state of Campeche, and W. by Campeche and the Gulf of Mexico. Area, 35,200 sq. kilometres. Pop. 360,000. The soil is poor and rocky, with no rivers, and mostly flat, but towards the boundary with Campeche and in the S. it is somewhat hilly. The climate is tropical and rather hot in the summer (April to September); in the months October to March the climate is delightful, with temperature ranging from 40° to 80° F. There is little malaria in Y. now and the yellow fever has been exterminated for some years past. Steamship lines call at the port of Progreso and there is rail communication with Campeche. The main product is sisal fibre, which in the olden days was called 'green gold,' and this constitutes the wealth of the state. There are some small sugar mills in the S. Only one crop of corn a year can be obtained, owing to the scarcity of rain. See G. Mason, *Silver Cities of Yucatan*, 1927.

Yucca, or Adam's Needle, a genus of slow-growing evergreen shrubs (order Liliaceae), bearing, when of a good age, a huge erect panicle with pendulous flowers from the centre of a circle of thick linear leaves. Y.

filamentosa is hardy, and flowers at an earlier stage than other species.

Yuen, or Yuan, a Mongol dynasty which ruled China during 1280-1367. It was founded by Kublai Khan, who built the new capital of Kaanbaligh (Cambaluc), later Peking. He died in 1294. Other rulers of this dynasty were Yüen-chêng (*d.* 1307), Wu-tsung (*d.* 1312), Jên-tsung (*d.* 1320), and Shun-ti, who came to the throne in 1333, and was driven out by Chu Yüen-chang in 1367.

Yugoslavia, an independent kingdom of E. Europe, until 1929 known as the Kingdom of the Serbs, Croats, and Slovenes, was created after the Great War from the former kingdoms of Serbia and Montenegro; Bosnia, Herzegovina, Dalmatia (except a small part which went to Italy), and parts of Styria, Carniola and Carinthia from Austria; and Croatia, Slovenia and Voivodina (parts of Baranya, Batchka and Barat) from Hungary. It has an area of 96,134 sq. m., and is bounded N. by Austria and Hungary, E. by Rumania and Bulgaria, S. by Greece and Albania, and W. by the Adriatic Sea and Italy. It was created as a constitutional parliamentary monarchy under the hereditary King of Serbia, but dissension between Serbs and Croats, both in and out of parliament, made national unity impossible. King Alexander I., therefore, in Jan. 1929, abrogated the constitution, dissolved parliament, and formed a cabinet, now composed of sixteen members, responsible to himself alone. At the same time he altered the name of the kingdom and divided it into nine areas, or banats, and the city of Belgrade, the capital. Each banat is ruled by an official with the rank of Cabinet Minister who is appointed by the King on the recommendation of the Minister of the Interior. Y. is a mountainous country except in the N. and N.E., where converge the Danube, Drava, Theiss (Tissa), Save and Morava rivers, all navigable save the last. Its climate is continental and it produces cereals, especially wheat and maize; vines, plums, apples and other fruits; hemp and cotton, which is grown for home use; tobacco, silk, poppies (both for opium and poppy-seed oil and cake), chestnuts and sugar beet. Stock-raising is, after agriculture, the chief industry; there are valuable fisheries in the Adriatic, and wide forest areas. The mineral wealth is great but little exploited, coal, iron, gold, copper, lead, asbestos, asphalt, chrome, antimony, salt, etc., being present. Flour-milling is one of the chief industries; others are cotton spinning and weaving, brewing, distilling and the production of beet-sugar, chemi-

cals, leather, pottery, etc. Carpet-making is carried on at Pirot, in Serbia. Export trade, chiefly in timber, grain, eggs, cattle, pigs, and copper, is carried on principally with Italy and Austria. Owing largely to Austrian efforts to separate Serbia from her own Slav areas, Y. had in 1918 five distinct rly. systems without direct inter-communication, and only two lines connected with the sea, though there are 58 harbours. Much has since been done to improve communications, but much still remains to be done. The chief inland towns are Belgrade, the capital, Subotitz, Zagreb, Sarajevo and Skoplye (Uskub). Split (Spalato) is the chief port; others are Shibenik (Sabenico), Gruz (Gracoza) for Dubrovnik (Ragusa), and Shushak. Cattaro is capable of great development when it has a rly. There are universities at Belgrade, Zagreb, and Liubliana, the last being of post-war foundation. Primary education is free and compulsory. There is complete religious toleration. Pop. (1931) 13,929,988. Other information will be found under the headings BOSNIA; MONTENEGRO; SERBIA, etc. See H. Baerlein, *The Birth of Yugoslavia*, 1922; J. Buchan, *Yugoslavia*, 1923; K. S. Patton, *Kingdom of Serbs, Croats, and Slovenes*, 1928.

Yukon: (1) A territory of N.W. Canada, with an area of 207,076 sq. m. The N. and W. are mountainous, but in some places the valleys can be utilised for growing crops. Y. owes its prosperity to the discovery of the gold mines in the Klondyke region (1896); recently silver has been found in the Mayo dist. Fishing and lumbering are other industries. Dawson City is the cap. Pop. of territory (1926), 8512; cap. 3450. (2) A riv. of the Yukon territory, and Alaska, formed by the junction of the Lewis and Pelly rivs. Length 2300 m., of which, in the summer, 1630 m. are navigable from the mouth in the Behring Sea. It was first explored from source to mouth in 1883 by F. Schwatka. Dawson's expedition in 1887 settled many points in connection with the geography of the riv. See *The Annual Report of the Geological Survey of Canada*, 1888-89; see also W. Ogilvie, *Early Days on the Yukon*, 1913; H. Stuck, *Voyages on the Yukon and its Tributaries*, 1919.

Yunnan, the most south-westerly prov. of China, bounded on the N. and E. by Szechuen, Kweichow, and Kwangsi, and on the S. and W. by Fr. Indo-China, Burma, and Tibet. Area 146,714 sq. m. The surface is mainly a lofty, uneven plateau, broken by mountain ranges and the gorges of rivs. The mountains are highest in

the N., where they reach 17,000 ft., sinking to 7000 or 8000 in the S. The chief rivs. are the Salwin, Yang-tse-kiang, and Me-kong. The plains and valleys are fertile, and agriculture and stock-raising are largely carried on, particularly in the S. and S.W. Excellent tea, tobacco, and silk are produced. The mineral wealth is considerable and includes copper-ore, which has been mined for many years, gold, silver, lead, tin, jade, and anthracite. Pop. (1926) 11,020,591. The cap., Yunnan-fu, stands near the N. shore of Lake Tien-shih, and on a great plateau at an elevation of 6400 ft. It is a walled city with numerous canals and has a large trade. Pop. about 150,000.

Yusuf - ibn - Tashfin, *see* ALMORAVIDES.

Yverdon, or Yverdun, a tn. of Vaud, Switzerland, at the N. end of Lake Neuchâtel, with a twelfth-century castle used as a school, and valuable mineral springs. Pop. 8627.

Yvetot, a tn. of dept. Seine-Inférieure, France, with important textile and other manufs. It was formerly the cap. of a small independent territory of the same name. Pop. (1926) 7134.

Ywrieff, Ywiev, Ywryev, or Dorpat, now known as Tartu, a tn. of Estonia, on R. Embach. It is a picturesque tn. with gardens occupying the old fortifications, and has a ruined cathedral and a celebrated university, founded in 1632 by Gustavus Adolphus. There are numerous manufs. and the tn. is a trading centre. It was one of the Hanse tns. Pop. 56,156.

Z

Z, like **Y**, was only found in the later Rom. alphabet, from which it has been transferred to the alphabets of W. Europe. In the Gk. series of letters it occupied the seventh place, the sixth being the property of the subsequently disused **Vau** or **F**. In chemistry, **Zn** and **Zr** are the atomic symbols for the metals zinc and zirconium, respectively.

Zaandam, or **Saardam**, a port and tn. in the prov. of N. Holland, the Netherlands, on the **Zaan**, 5 m. N.W. of Amsterdam. It has a great number of saw- and wind-mills, and manufs. paper, glue, tobacco, and dyes. In 1697 Peter the Great worked in the shipbuilding yards here. Pop. (1928) 31,624.

Zabern, now **Saverne**, a tn. and canal port of Lower Alsace, France, in the dept. of Bas-Rhin, on the Rhine-Marne canal and the R. Zorn, 20 m. N.W. of Strasbourg; manufs. tools, woollen cloth, and hosiery. Famous for the 'Zabern affair,' 1913-14. The tn., when still in Ger. hands, was the scene of the harshest and most aggressive conduct of the Ger. garrison towards the civilian pop. This treatment culminated in the sabre-slashing of a lame cobbler by a Prussian officer. The Reichstag tried in vain to secure the supremacy of the civil authorities after the latter had failed to assert themselves. *Consult* C. D. Hazer, *Alsace-Lorraine under German Rule*, 1917. Pop. (1926) 7916.

Zabians and **Zabism**, see **SABÆI** or **SABÆANS**.

Zabrze (now **Hindenburg**), a tn. of Silesia, Prussia, has coal-mines, cable and other works, and breweries. Pop. 63,000.

Zacatecas: (1) A state of Mexico; area 24,471 sq. m. Is rich in silver and other minerals. In the N. and E. are extensive cattle ranches. Pop. 379,329. (2) A city, cap. of foregoing, a centre for silver mining. Has a cathedral, a large college, and a mint. Pop. 20,000.

Zachariae, **Karl** (1769-1843), Ger. jurist, b. in Saxony, and educated Leipzig University. Professor of law at Heidelberg. Wrote on human

and canon law as well as on modern codes. His chief works were *Vierzig Bücher vom Staate*, 1839-42; and *Die Wissenschaft der Gesetzgebung*, 1806. *Consult* Robert von Mohl's *Geschichte der Staatswissenschaften*. 1855-58.

Zacharias, **St.** (d. 752), pope, of Gk. parentage; he succeeded Gregory III. as pope, and in that capacity exercised considerable political influence. He visited Luitprand, King of the Lombards, in 743, and confirmed Pepin the Short in his usurpation of the Fr. throne. He started the Vatican Library and translated Gregory's *Dialogues* into Gk.

Zacynthus, see **ZANTE**.

Zadkiel, the pseudonym of **Richard James Morrison** (1794-1874), a retired naval lieutenant, astronomer, and Hebraist, who started a prophetic astrological almanac (1830) which attained great popularity.

Zagazig, a tn. of Lower Egypt, cap. prov. of Charkieh, 50 m. N.E. of Cairo. It is a busy and important market place, and educational centre, and is a centre for the cotton trade. Nearby are the ruins of Bubastis. Pop. (1927) 52,839.

Zaghlul Pasha (c. 1857-1927), Egyptian politician; b. of *fellaheen* parentage at Biana in the Delta. Educated: Mohammedan University of El Azhar. Was with Arabi Pasha in the rising of 1882. Called to Bar, became a Counsellor of the Court of Appeal, 1893. Coming under notice of Mustapha Fahmy (Prime Minister, 1895-1908) and Sheikh Mohammed Abdu, he was introduced to Lord Cromer; became Minister of Education, 1906; of Justice, 1910. Having made allegations against the Khedive of which he could not offer legal proof, was forced by Kitchener to resign, 1912. Thenceforth, the apostle of Egyptian nationalism. Immediately after Great War, he demanded complete independence for Egypt: this demand being ignored, he organised the 'Wafd' movement. The British deported him to Malta, 1919. Released through influence of Lord Allenby, he directed party operations from Paris. Met Lord

Milner in London, failed to come to agreement. Arrested again in Egypt at end of 1921, was kept at Aden, and then in the Seychelles, till 1923. Had great majority in first election under new constitution; became Prime Minister early in 1924. Visited England; conferred fruitlessly with Ramsay MacDonald. The Stack murder in November led to Z.'s resignation. His election as President of the Chamber in 1925 merely caused its dissolution. On fall of Ziwar Pasha's ministry in 1926, Z. was about to succeed him when he was dissuaded by British influence.

Zagreb (Croatia), see AGRAM.

Zaharoff, Sir Zacharias Basileios, financier; b. Oct. 6 (O.S.), 1849, at Mughla, Turkey in Asia, of Gk. parentage. Educated at Eng. school, Constantinople; there entered uncle Sevastopoulos's business of cloth-merchant. In London, in early 'seventies, Sevastopoulos tried to have Z. extradited for embezzlement, but charge failed. Z. went to Athens, and in 1877 became agent for Swedish armament firm of Nordenfält. Thenceforward, associated with Nordenfält's and its British successors; and after Great War was frequently, as one of the richest men in the world, consulted by Allied statesmen: G.C.B., 1921. Has founded chairs of aviation and literature in England and France.

Zaila, see ZEYLA.

Zaimis, Alexander, Gk. statesman; b. Oct. 28, 1855, in Athens. Educated: Athens, Leipzig, Heidelberg, Paris. Deputy from 1885. Minister of Justice, 1890-92. President of Chamber, 1895-97. Prime Minister, 1897-99, 1901-02. High Commissioner of Powers, in Crete, 1906-11. Premier again under King Constantine in opposition to policy of Venizelos: 1915, 1916, 1917. Premier again, 1926-28. President of Gk. Republic since Dec. 1929.

Zaire River, see CONGO RIVER.

Zaisan, or Dzaisan, a lake in Semipalatinsk, Russian Central Asia, situated between the Tarbagatai and Altai Mts. It receives the waters of the Black Irtysh and empties itself into the Irtysh. Area about 700 sq. m.

Zaleucus (fl. seventh century, B.C.), the earliest Gk. legislator, who said he had received his code by revelation from Pallas. He settled in Locri Epizephyrii, S. Italy.

Zama, a tn. in Numidia, N. Africa, 70 m. S.W. of Carthage, was the scene of Scipio's victory over Hannibal (201 B.C.) which ended the Second Punic War.

Zambesi, a riv. of S. Africa, extending mainly through Rhodesia and Portuguese E. Africa, about lat. 16° S.

Its length of about 2200 m. is only exceeded in Africa by the Nile, Congo, and Niger; its drainage area is about 520,000 sq. m. It rises at a height of about 5000 ft. in N.W. Rhodesia, near the borders of Belgian Congo, some 300 m. E. of Lake Dibolo, whose waters it receives. Its general course is S.E. through the Baroki Valley to the Victoria Falls (q.v.). From here the riv. bends N.E. and E. nearly to Tete, when it resumes a S.E. course to the delta, situated some 200 m. N.E. of Sofala in the Mozambique Channel. Its volume is largely increased by the Shire bringing the waters of Lake Nyasa. The delta has seven principal channels, of which the R. Chinde is the most important. The riv. is navigable for 120 m. from its mouth, though with difficulty in the dry season, and for special riv. steamers (stern-wheel) up to Tete, and on the R. Shire to Chiromo. Below Tete the Lupala Gorge has a width of about 200 yds. and a very strong current. In general, on account of the small rainfall and the terrace formation which characterises the whole continent of Africa, the riv. is only navigable in isolated stretches, and then precariously. Livingstone was the first explorer of the upper riv. between 1851 and 1853; he discovered the Victoria Falls (1855) during his descent of the riv. to its mouth.

Zamboanga: (1) A dist. in the W. of Mindanao, Philippines, with an area of 3358 sq. m. Rice, tobacco, sugar-cane, coffee, copra, hemp, etc., are cultivated. Pop. 47,000. (2) Cap. of Mindanao Is. It is an old Spanish fortress, now an open port with naval stations. Pop. 17,000.

Zamenhof, Lazarus Ludovic (b. 1859), inventor of Esperanto (q.v.); see also *The Life of Zamenhof*, by Edmond Privat (Eng. trans. 1932).

Zamia, a genus of dwarf trees (order Cycadaceae). *Z. caffra* is the bread tree, its pith being used by the natives of S.E. Africa for food.

Zamora: (1) A prov. in Leon, Spain, on the Portuguese frontier. Area 4097 sq. m. It is watered by the Douro and its tributaries. Pop. (1928 est.) 268,214. (2) City and cap. of above prov., on the Douro, 40 m. N.N.W. of Salamanca. It has a late Romanesque cathedral, and manuf. wines, woollens, and linen. Pop. 17,567. (3) A tn. in Michoacan state, Mexico, on the Zamora R., 200 m. W.N.W. of Mexico City. Pop. 15,116. (4) A state of Venezuela just E. of the Cordillera Merida. Cap. Barinas. Area 13,587 sq. m. Pop. (1926) 57,341.

Zamora, Niceto Alcalá, President of the Spanish Republic. An able

and successful lawyer and politician, who served as a Monarchist in the Ministry of the Marqués de Alhucenas. Later, through disagreement with the principles of the Dictatorship of Primo de Rivera, he changed his political faith and became leader of the Liberal Democrats. In April 1930 he outlined the type of Conservative Republic that, in his view, Spain ought to adopt as a solution of her problems. His was the first noteworthy defection from the Monarchist ranks and foreshadowed the downfall of the Monarchy. He was elected first president of Spain in Dec. 1931 by an overwhelming majority, obtaining 362 votes as against the remaining five candidates' 7, 2, 2, 1 and 1 respectively.

Zanesville, a city of U.S.A., co. seat of Muskingum co., Ohio, on R. Muskingum. Manufs. bricks, tiles, pottery, iron and steel, glass, and machinery. Pop. (1930) 36,440.

Zangwill, Israel (1864-1926), Jewish-Eng. man of letters; b. in Feb., 'within sound of Bow Bells,' London. Began life as a teacher and then became a journalist; then wrote essays, novels, and plays. His first book, an amusing phantasy, *The Premier and the Painter*, appeared in 1888. It was followed by: *The Bachelors' Club*, 1891; and *The Old Maids' Club*, 1892: clever works—in which, however, the humour is overstrained. *The King of Schnorrers*, 1894, a grotesque tale of Jewish life in the East End of London in the eighteenth century, made him famous. Z.'s best book, *The Children of the Ghetto*, 1892, is, as the title denotes, a study of Jewish life in England; and it is not only an interesting novel, but a valuable contribution to social history. Among his other books are: *The Master*, 1895; *Dreamers of the Ghetto*, 1898. Plays include: *Six Persons*, 1892; *Merely Mary Ann*, 1903; *The Next Religion*, 1912; *We Moderns*, 1923.

Zante (anc. *Zacynthus*): (1) One of the Ionian Is., a dept. of Greece, 8 m. S. of Cephalonia; produces pitch, oil, and gypsum. Fruit is grown in large quantities. Earthquakes are of frequent occurrence. Area 277 sq. m. Pop. (1928) 40,492. (2) Cap. of above, is a seaport on the E. coast, and exports currants, soap, olives, and fruit. Pop. (1928) 11,609.

Zanzibar: (1) A sultanate of Eastern Africa, under British protection since 1890, comprising the two islands of Z. and Pemba. British interests were recognised by France and Germany, in accordance with conventions which ceded Madagascar to France and Heligoland to Germany. A regular gov. was formed in 1897,

and reorganised in 1906. In 1913 the control of the Protectorate was transferred to the Colonial Office from the Foreign Office. Area of the sultanate is 1020 sq. m. The reigning sultan, Seyyid Sir Khalifa bin Harub (b. 1879), succeeded on his brother-in-law's abdication in 1911. A British resident administers the gov. under the Z. Order in Council, 1924, amended in 1925. The High Commissionership was abolished in 1925. Legislative and executive councils, presided over by the British resident and the Sultan respectively, were set up in 1926. The chief exports are cloves, ivory, copra, and rice. The clove industry is by far the most important, the two is. of Pemba and Z. yielding over 80 per cent. of the world's supply. A hurricane at the end of the last century destroyed the bulk of the trees, but in ten years the industry was more flourishing than before. A Clove Grower's Association was organised in 1927, and held its first annual conference in July 1928. Z. manufs. pottery, coir fibre and rope, soap, coconut and simsim oil, jewellery, and mats. There is no mining industry. The exports in 1929 were valued at £1,722,498, and the imports at £1,664,242. Pop., Z. and Pemba, 216,800; Z. 128,000, mostly Swahilis, though there are representatives of every African tribe. The Europeans number about 300. See Lyne, *Zanzibar in Contemporary Times*, 1905, and Craster, *Pemba: the Spice Island of Zanzibar*, 1913; R. H. Crofter, *Statistics of Zanzibar Protectorate, 1893-1928*, 1929; W. H. Ingrams, *Zanzibar*, 1924; Major F. B. Pearce, *Zanzibar, Past and Present*, 1920. (2) An is. of Eastern Africa, in the Indian Ocean, forming, with Pemba, the sultanate of Z. Area 640 sq. m. The chiefs are Zanzibar (cap.), Tabora, Nyangwe, and Ujiji. Pop. 128,000. (3) Cap. of the above is, situated on its W. coast, and where resides the British minister of the sultanate of the same name. It was once the greatest slave market in the world. Z. is the largest tn. in East Africa, and has a magnificent harbour, which presents excellent facilities for shipping and trade generally. It has an extensive trade in ivory, copal, caoutchouc, cloves, and copper ware. There are Fr. and Eng. hospitals, missions, barracks, etc. Pop. 38,000.

Zaparos, a tribe of S. American aborigines, who dwell in the country between the rivs. Pastaza and Napo. They have the characteristics of the Mongolic race and are polygamists.

Zapolya, or **Zapoly**, an illustrious Hungarian family of Slavonian origin: *Stephen Zapolya* (d. 1499) fought as

a general under Matthias Corvinus, King of Hungary, in the conquest of Austria, over which he was appointed governor (1483). After the death of Corvinus, he procured the accession of Wladislaw II. His daughter, Barbara, by marriage with Sigismund I., became Queen of Poland. His son, *Johann I.* (1487-1540), proclaimed himself King of Hungary (1526) in opposition to Ferdinand of Austria. The Turks helped him in his struggle against Ferdinand, who finally reduced his territories to Transylvania. *Johann II.* (1540-71), son of the preceding, inherited the kingdom of Transylvania and parts of Eastern Hungary.

Zaporogians, see COSSACKS.

Zara (Rom. *Iadera*), former cap. of Dalmatia, Austria, now a free port of Italy on the Adriatic Sea, 52 m. S.E. of Trieste; manufs. maraschino, glass, oil, flour, and wax. It is the seat of a Rom. Catholic archbishop, and has several notable churches, the cathedral dating from 1202. The tn. was a Rom. colony; was purchased from Hungary by Venice in 1409, and passed to Austria in 1792. After the Great War it became again Italian. It is a naval station. Pop. (1928) 18,779.

Zaragoza, see Saragossa.

Zaria, an inland prov. of Northern Nigeria, with an area of 22,000 sq. m. It is watered by the Kaduna and its tributaries, and its soil is fertile, the chief products being cotton and sugar. It is crossed by the Iddo-Kano railway. Pop. about 340,000.

Zarskoe, see TSARSKOE SELO.

Zea, see CEOS.

Zealand, see ZEELAND.

Zealots (Gk. *ζηλωτής*, an enthusiast, from *ζεῖν*, to boil), a loosely organised party among the Jews at the time of Christ. They carried on the Maccabean tradition, and were uncompromising in their resistance to all Rom. authority. They aimed at the complete political emancipation of Judæa, but were never able to carry on more than a desultory warfare. It was their fanaticism and vigour that brought about the rising which culminated in the Fall of Jerusalem. To this party belonged Simon, one of the Twelve Apostles.

Zebra, a group of three equine species confined to the African continent. They are the true or mountain Z. (*Equus zebra*), Grévy's Z. (*E. grevyi*), and Burchell's Z. (*E. burchelli*). Until the middle of the nineteenth century a fourth species, the Quagga, existed, but this is now extinct. The mountain Z. has short, clean legs, hard, well-shaped hoofs, and long ears. Its body colouring is silvery white with black or dark

brown markings. It is a rapidly vanishing species. Grévy's Z. is a much larger animal and has finer and more numerous black or brown markings on a clear white ground. Burchell's Z. is intermediate in size, and its black or brown stripings are differently arranged. These, when broken in young, lend themselves more readily to domestication than the other species.

Zebu, or *Bos indicus*, an ox which exists only in a domesticated state in Asia. It is characterised chiefly by its large hump, or sometimes two humps, over the withers and by a greatly developed dewlap. Its colour varies from ashen grey to pure white, and white bulls, known as Brahmin bulls, are held sacred by the Hindus. They vary greatly in size, and in India are used as beasts of burden and draught.

Zechariah, the eleventh of the minor prophets; was a contemporary of Haggai, whom he supported in urging the people to rebuild the Temple. The book which bears his name is clearly divided into two parts of very dissimilar character. The first part, consisting of chs. i.-viii., is universally regarded as the original work of Z., and as belonging to the years 520 and 518 B.C., the second and fourth years of Darius Hystaspes. The whole of the second part of the book (chs. ix.-xiv.) is placed by most critics after the Exile. It is possible that these six chapters come from the same unknown hand, having been written at different times and under very different circumstances. Some critics, however, see evidence of four different hands. It is impossible here to give a detailed analysis of either of the two big divisions, but we may note the large outlook which the first section shows and its great emphasis on the necessity of moral obedience as of supreme importance in the service of Yahweh.

Zedekiah, the last king of Judah and Jerusalem (597-586 B.C.), was originally named Mattaniah. He was set on the throne as vassal king by Nebuchadnezzar, when his nephew Jehoiakim was carried away to Babylon. He joined a coalition against Babylon, and Jerusalem was again taken. Z.'s eyes were thrust out, and he, too, was carried away captive.

Zeebrugge, a seaport, W. Flanders prov., Belgium, 7 m. N. of Bruges, whose port it is. It has a fine breakwater, and a ship canal (7 m. long), connecting it with Bruges, which was opened by King Leopold in 1907. For events at Z. during the Great War see WAR, THE GREAT—British Naval Raids on Zeebrugge and Ostend; and VINDICTIVE.

Zeehan, a tn. of Tasmania, 90 m. E.N.E. of Hobart. It is the centre of a silver-mining dist. Pop. 3000.

Zeeland, or **Zealand**, the southernmost prov. of the Netherlands, has an area of 708 sq. m. Besides the mainland, five is. are included in the prov. Surface very flat and much of it below sea-level. Climate very damp. Corn, butter, cheese are produced, and cattle reared. Chief tns., Middelburg (cap.) and Flushing. Pop. (1928) 248,592.

Zeeman, Pieter, b. 1865, a Dutch physicist, professor of physics at Amsterdam since 1900. He was awarded the Nobel prize in 1902, and his most important work was concerned with the behaviour of the lines of a spectrum in a magnetic field (see **ZEEMAN EFFECT**). Z. is a member of the Royal Society.

Zeeman Effect. In 1896 Zeeman discovered that the yellow lines of the sodium spectrum were slightly broadened when the sodium flame was placed between the poles of a powerful electromagnet. He subsequently found that three distinct lines could be produced from a single spectral line and that the lines exhibited definite polarisation (q.v.). If the light emitted by an incandescent element is examined in the direction of the magnetic field it is seen that each normal spectral line gives rise to two distinct lines; one, displaced towards the region of shorter wave-lengths, is circularly polarised in a right-handed direction with respect to the magnetic field; the other, displaced towards the region of longer wave-lengths, is circularly polarised in a left-handed direction with respect to the magnetic field. Since the direction of emission of the analysed light is parallel to the magnetic field, this is known as the *longitudinal* effect. If the light is examined in a direction perpendicular to the magnetic field, *three* lines are observed, all of which are plane-polarised. This is known as the *transverse* effect. One of the three lines coincides with the position of the original line, while the displacements of the others are identical with the displacements observed in the longitudinal effect. The Z. E. is quite small and with a magnetic field of intensity of 10,000 gauss the separation is only of the order of 10^{-8} cm. Complex Z. Es. are observed in the case of spectral doublets and triplets, and Runge and Preston have derived simple rules governing the phenomena exhibited in these cases. Larmor and others have shown that the Z. E. is due to the precession of the electronic orbits in the atom about the direction of the magnetic

lines of force. The close agreement between theory and experiment provides important evidence in favour of the modern theory of the atom and the quantum theory (q.v.). See Sommerfeld, *Atomic Structure and Spectral Lines*.

Zeiss, Carl (1816-88), Ger. optician, b. and educated at Weimar; then apprenticed to various instrument-makers in Weimar, Stuttgart, and Vienna. In 1846 he opened his own workshop at Jena. In 1866 he began his connection with Ernst Abbe (1840-1905), subsequently professor at Jena University. With the aid of Otto Schott, founder of the Jena Glass Works, they worked upon the microscope, perfecting the homogeneous immersion lens in 1878. Roderick Z., son of Carl Z., organised their work on a commercial basis, retiring in 1889, when the firm was incorporated as the Carl-Zeiss-Stiftung. The Z. firm has now a world-wide reputation, embracing every kind of optical instrument.

See F. Auerbach, *The Zeiss Works and the Carl Zeiss Foundation in Jena*, Eng. trans., 1927.

Zeist, or **Zeyst**, a tn. in the prov. of Utrecht, Netherlands, with manufs. of porcelain-stoves, candles, soap, etc. Pop. (1928) 23,053.

Zeitun, now **Suleimanlu**, a tn. of Turkey. An Armenian centre, it suffered severely during the Great War. Pop. 10,000.

Zeitz, a tn. of Prussia, 25 m. S.S.W. of Leipzig. Has a fine church, once a cathedral. Manufs. cotton goods, machinery, and earthenware. Wine and spirits are also produced. Pop. 35,000.

Zell, or **Zelle** (Prussia), see **CELLE**.

Zeller, Eduard (1814-1908), a Ger. philosopher, b. at Kleinbottwar in Württemberg. He was professor of theology at Bern in 1847, and at Marburg in 1849, but forsook theology for historical work, and occupied the chair of philosophy at Heidelberg in 1862 and at Berlin in 1872. His chief work was: *Die Geschichte der Griechischen Philosophie* (5th ed.), 1892, translated into Eng. as *Socrates and the Socratic Schools*, but he also wrote *Stoics, Epicureans, and Sceptics; Plato and the Older Academy; The Pre-Socratic Philosophy; The Eclectics; Aristotle and the Early Peri-patetics*.

Zemindar (from a Persian word, signifying a landholder), in India the headman of a village group, whose chief function was that of a farmer of land revenue. Lord Cornwallis converted them into landholders, but the only result of the change was to place the ryots, who were the actual cultivators of the soil, at their mercy.

The office of these tax-collectors was often hereditary.

Zend, a word as to the ultimate use of which there is at present uncertainty. It is generally used for the language in which the sacred books of the Parsees were written, but some hold that the word means 'a commentary.' The *Zend-Avesta* is a collection of the ancient religious lore of the Parsees, and its authorship is traditionally ascribed to Zoroaster. It falls, however, into two main divisions, the Old Avesta and the New Avesta, which divide into a number of sub-sections. It is very diffuse, and is full of repetitions and trivial addresses to spirits good and evil. The critical study of these works has not yet been carried far. There is an edition by Geldner (1886-94), and a translation in the series of *Sacred Books of the East*. See also E. G. Browne, *Literary History of Persia*, 1903.

Zenith, the point where a vertical line terminates in the celestial sphere, and thus the opposite of the nadir. It is therefore an important point of reference in astronomy; Z. distance being the angular distance from the Z. and the complement of altitude. The Z. telescope, now superseded by the transit instrument, was invented for measuring the difference between the Z. distances of a pair of stars, culminating near the Z. at about the same time, one N., the other S., from which latitude can be determined by Talcott's method. By Sir G. Airy's reflex instrument, the star's image is viewed by reflection from a mercury surface.

Zeno (fl. 500 B.C.), a Gk. philosopher, a native of Elea in Italy. He was the favourite disciple of Parmenides, whom he accompanied to Athens, and whose teaching he expounded. He was a lover of freedom, and on his return to Elea joined an unsuccessful conspiracy against the tyrant Nearchus. See Zeller, *Pre-Socratic Philosophy*, and Mullach, *Fragmenta Philosophorum Græcorum*.

Zeno (c. 340-265 B.C.), the founder of the Stoic philosophy, was a native and merchant of Citium in Cyprus, and probably of Semitic origin. He attached himself to the cynic Crates, but, later, studied under Stilo of the Megarian school, and Diodorus Cronus and Philo of the same school. He then proceeded to the Academics, Xenocrates and Polemo, and having thus spent some twenty years in study, opened a school for himself in the 'Painted Porch,' *Στοὰ Ποικίλη*, which, at an earlier time, had been a place in which poets met. Hence his disciples were called Stoics (q.v.).

Zeno, Emperor of the East 474-491, was a native of Isauria. He was compelled to leave Constantinople in 475 in consequence of a revolt in favour of his brother Basiliscus, but returned the following year. His whole reign was disturbed by revolts and foreign wars, and in 487, when the Gothic king took up arms and threatened Constantinople, Z., to save himself and his capital, gave him permission to invade Italy and expel the usurper Odoacer.

Zenobia, Queen of Palmyra (Tadmor in the wilderness). After the death of her husband, Odenathus (A.D. 266), she assumed the imperial diadem, as regent for her sons. She sought to include all Syria, Asia, and Egypt within her sway, and to make good the title which she claimed of Queen of the East. She was defeated by Aurelian, taken prisoner on the capture of Palmyra (273), and carried to Rome. Her life was spared by Aurelian, and she passed the remainder of her years with her sons in the vicinity of Tibur (Tivoli). Longinus (q.v.) lived at her court.

Zenodotus (*Ζηνοδότος*) (fl. c. 208 B.C.), a Gk. grammarian, was a native of Ephesus. He was the first Reviser (*Διορθητής*) of Homer, and the first superintendent of the great library at Alexandria.

Zeolites, a family of minerals consisting mainly of hydrous silicates of lime, soda, and alumina, which have resulted from the alteration of feldspars and feldspathoids. Being chiefly secondary products, they occur in cavities and veins, and are common in amygdaloidal basalts, where they present a finely fibrous structure. Among the more common zeolites are analcite, natrolite, stilbite, prehnite, and laumontite. They have a specific gravity of about 2-3, and a hardness of from 3.5 to 5. Artificial minerals resembling Z. in composition are used in water-softening (q.v.), as, for example, in the Permutit process.

Zephaniah, the ninth of the minor prophets, has left a short but most valuable prophecy. He prophesied in the reign of Josiah, king of Judah (639-608 B.C.), almost certainly before the discovery of the Book of the Law. His book has two main divisions: (1) Chapters i. 2 to iii. 8, containing a warning of judgment; (2) iii. 9-20, giving a promise of salvation.

Zephyrus (*Ζέφυρος*), the personification of the West Wind, was the son of Astræus and Eos. He was the father of the horses Xanthus and Balius by the Harpy Podarge, and the husband of Chloris, by whom he begot Carpus.

Zeppelin, Ferdinand, Count von (1838-1917), a Ger. army officer and

aeronaut, b. at Constance. He studied at the Polytechnik, Stuttgart, and at the Kriegsschule, Ludwigsburg, afterwards proceeding to Tübingen University. He took part in the American War of Secession, and also served in the Franco-Ger. War (1870), but from 1897 to 1900 was occupied in the construction of his first airship or dirigible balloon of rigid type, making his first ascent in 1900. Several of its improved successors came to grief, but on the whole the rigid dirigible has made the most important progress, and that chiefly owing to Z. Died at Charlottenburg, March 8. See also AERONAUTICS; ZEPPELINS. Consult Margaret Goldsmith, *Count Zeppelin*, 1931.

Zeppelins. Rigid airships invented by the Ger. Count Zeppelin in 1900. It was while Zeppelin was with the Union army in the American Civil War as an observer in a captive balloon that he conceived the idea of his invention. In 1894 he designed his first rigid airship and after many failures success was achieved in 1900. At the outset of the Great War Germany made use of Zs. for bombing strategical points such as railways and masses of troops. The first three Zs. were, however, brought down and destroyed. Zs. were employed either for observation purposes or for bombing on all European fronts. Raids were also made over London. To avoid attack from enemy aircraft greater altitude of Zs. was required and an engine was removed from the airship in order to lighten it, gondolas being made smaller and stream-lined. But as the removal of the engine lowered the speed, better engines were made. Eventually a speed of 60-70 m. p. h. was obtained at a height of 6000 ft. During 1917 a Z. crossed the Atlantic to Chicago. The use of incendiary bullets against Zs. proved very effective and lessened their chances of success. The Ger. army never favoured Zs. and gave them up, but the navy retained and used them for reconnaissance purposes. After the War the majority of Zs. were handed over to Allied countries under the Treaty of Versailles. The Locarno Treaty, however, removed the restrictions upon Germany for the building of Zs. and the Zeppelin Company have since built some. Dr. Eckener, who is now the leading expert on the development of Zs. to-day, is endeavouring to establish aerial transport between nations by this method. The present *Graf Zeppelin* has made a flight that may endure for years, and Dr. Eckener has proved himself a great navigator. Among the airship's

achievements was a flight to the U.S.A. in 1928; a trip round the world in 1929; a flight from Leningrad to the North Pole in July 1931, and several successful trips to Brazil. The only other successful airship of the size and type of the *Graf Zeppelin* is the *Los Angeles* belonging to the U.S. Navy. It was built at the Zeppelin works. The other great American dirigible, the *Akron*, has not yet (1932) been fully tested. It is the largest ever built, and was the work of the Goodyear-Zeppelin Co. of the U.S.A.

Zerbst, a tn., Anhalt, Germany, on the Nuthe, 22 m. S.E. of Magdeburg; has manufs. of machinery, beer, starch, cloth, leather, soap, and chemicals. Parts of the anct. walls remain. Catherine II. of Russia was the daughter of Prince Anhalt-Zerbst. Pop. 19,480.

Zermatt, a vil., Valais canton, Switzerland, at the head of the Visp Valley (5315 ft.), and at the foot of the Matterhorn, 22 m. by rail from Visp in the Rhône Valley; is a favourite tourist resort. Permanent pop. 800. F. Gos, *Zermatt and its Valley* (Eng trans. 1926).

Zero (Arabic *cafra*, to be empty), a term applied in mathematics to 0, or to quantity so small as to be negligible, and in physics to a point which serves as the base of measurements.

Zeromski, **Stephan** (1864-1925), one of the famous men in modern Polish literature, was b. at Strawczyn and d. at Warsaw. Like so many Polish patriots, wounded by the division of his natal soil between Austria, Germany and Russia, he was passionately attached to his land, to its past and the hope of its future. One of his most famous books is *The Ashes*, a recital of the deeds of the famous Polish Legion, which fought in so many of Napoleon's battles all over Europe. Another famous book is *Elegy on the Hetman*.

Zetland, Sir Lawrence John Lumley Dundas, second Marquess of (until 1929 called Earl of Ronaldshay), b. June 11, 1876; eldest surviving son of first Marquess. Educated: Harrow; Trinity College, Cambridge. Travelled all over Asia, 1898-1907. M.P. (Unionist), Hornsey, 1901-16. Governor of Bengal, 1917-22. G.C.I.F., 1917; P.C. and G.C.S.I., 1922. Publications: *Sport and Politics under an Eastern Sky*, 1902; *A Wandering Student in the Far East*, 1908; *India, a Bird's-Eye View*, 1924.

Zeuglodon, a genus of extinct whales, found in the Eocene and Miocene strata of N. America, Europe, and Egypt. They were upwards of 50 ft. long, and the remains are the

oldest known fossils of the order Cretacea. (See CRETACEOUS SYSTEM.)

Zeugma (Gk. *ζεύγμα*, a yoking), a figure of speech in which a verb or adjective is used with two nouns, though strictly referring only to one.

Zeus, see JUPITER.

Zeuss, Johann Kaspar (1806-56), a Ger. philologist, b. at Vogtendorf (Bavaria). Studied at Bamberg and Munich. Took up the study of comparative philology. Wrote (1837) *The Germans and the Neighbouring Races* and other works. His great achievement is his *Celtic Grammar* (1853), a work of vast and painstaking erudition.

Zeuxis (fl. 425-400 B.C.), a celebrated Gk. painter, b. at Heraclea. He belonged to the Ionic school of art and apparently drew his inspiration from Apollodorus. Pliny, Lucian, and Cicero tell many curious anecdotes concerning him. The chief works ascribed to Z. were an 'Eros at Athens,' an 'Infant Hercules,' and 'Jupiter enthroned.'

Zeyla, Zeilah, or Zaila, a tn. in British Somaliland, E. Africa, on the Gulf of Aden; occupied by the British since 1884. It exports mother-of-pearl, coffee, and hides, but has lost its former commercial prosperity. Pop. about 5000.

Zhitomir (Russia), see JITOMIR.

Zhob, a riv. of N.E. Baluchistan. Rises in the Khand and runs E. to Gonal, where it turns N.N.E. and joins the Gomal. It was explored in 1864 by Lieutenant Wahab, who describes the valley as an alluvial plain of fair fertility. It is of strategical importance.

Zieten, Hans Joachim von (1699-1786), a Prussian general, b. at Wustrau. He joined a cavalry regiment, and served in the Silesian wars and in the Seven Years' War with great distinction. See Life by Winter (1885).

Zilleh, or Zile, a tn. in the vilayet of Sivas, Turkey. It was from here that Cæsar conquered the Pharnaces after having made his famous boast, *Veni, vidi, vici* (47 B.C.). Pop. 20,000.

Zillerthal, a beautiful Alpine valley of the Tyrol, 25 m. E. of Innsbruck. It is watered by the Ziller, a trib. of the Inn. A number of the inhabitants fled from religious persecution to Prussia in 1837.

Zimbabwe, the site of some ruins in S. Rhodesia, S. Africa, 120 m. E. of Sofala. Discovered by Renders, 1868; described by Mauch, 1871. They present the general appearance of a fortress, and were probably erected either by Arabs or by one of the Bantu races. By some these relics of a lofty culture are attributed to the navigators who, centuries ago,

came down from Arabia in quest of gold. This hypothesis is supported by the evidences of solar worship found at Z.—evidences which have a distinct connection with the inscriptions to be seen on stone relics of the past in southern Arabia. The designs on the Z. and other neighbouring remains exhibit natives with distinct Hottentot physical characteristics, and the inference from this is that 2000 years ago, when these monuments were erected, the black Bantu races were not familiar to the Arabian gold miners. Consult H. L. Tangye, *In New South Africa*; T. Bent, *Ruined Cities of Mashonaland*.

Zimmermann, Alfred (1859-1925), Ger. statesman; b. May 8, at Frankenstein; studied in Breslau and Berlin; became doctor of philosophy and travelled. In 1890 entered the Foreign Office. Became 'Legationsrat' in 1899. In 1901 he was in the embassy in London. Under-secretary for Foreign Affairs from 1911; in 1916 succeeded Jagow as Foreign Secretary. In Jan. 1917 the American Gov. discovered that Z. was trying, in view of probable rupture with U.S.A., to come to an arrangement with Mexico and Japan to the prejudice of U.S.A. In August he retired. Died in Berlin, Feb. 26. Wrote some historical works.

Zinc, symbol Zn, atomic number 30, atomic weight 65.38, a metallic element generally met with in combination as the carbonate (calamine), ZnCO_3 , and the sulphide (zinc blende), ZnS . It also occurs as silicate (hemimorphite), $\text{ZnSiO}_3 + \text{H}_2\text{O}$, and as red Z. ore, ZnO . The extraction of the metal from its ores is carried out in two stages, the oxide being first formed and in the second stage this is reduced by carbon. Blende is the ore generally employed, and this is converted to oxide by roasting in air. The crude oxide is mixed with coal or coke and strongly heated by gas-fired furnaces, in clay retorts or muffles, and the Z. vapour condensed in an iron box (Silesian process). In the Belgian process the mixture is heated in a horizontal fire-clay tube connected by a conical clay tube to a sheet iron condenser. The crude Z. is melted in a reverberatory furnace and further purified by distillation. Z. is a bluish-white brittle metal (sp. gr. 7, melting-point 430° , boiling-point 930°) which is malleable between 100° and 150° C. It is permanent in air at ordinary temperature, and is used for galvanising iron for roofing purposes, etc. A number of alloys are formed by Z. with other metals, e.g. brass (copper and zinc), bronze (copper, tin, and zinc), etc. Z. burns in air, forming the

oxide, ZnO (Z. white). The oxide is white at ordinary temperature, but becomes yellow on heating. It is a basic oxide, and the salts of the metal can be prepared by its solution in acids. Z. sulphate is obtained by solution of the metal or oxide in sulphuric acid, or is made on the large scale by roasting Z. blende in air. The sulphate crystallises from water, forming colourless rhombic prisms of the formula $ZnSO_4 \cdot 7H_2O$ isomorphous with magnesium sulphate (Epsom salts). It has a metallic, astringent taste, is poisonous, and is used as an emetic. Z. chloride is formed by dissolving the metal or oxide in hydrochloric acid, and boiling the solution down until it solidifies on cooling. It is a white deliquescent substance, and made into a paste with Z. oxide rapidly sets to a hard mass. This mixture is used in dentistry as a filling. A solution of the chloride is used as a flux in soldering. See H. O. Hofman, *Metalurgy of Zinc and Cadmium*, N.Y., 1922; D. B. Faloan, *Zinc Oxide: History, Manufacture and Properties as a Pigment*, 1926; C. G. Maier, *Zinc Smelting* (U.S.A. Bureau of Mines), 1930.

Zincography, see PROCESS WORK.

Zinder, or **Sinder**, a walled tn. of Fr. Sudan (Upper Senegal and Niger Colony), W. Africa, 350 m. from Timbuktu, cap. of Damerghu dist. There is trade in salt, spices, silks, ostrich feathers, etc., and telegraph communication with Kayes and Niamey. It is a centre for trade across the Sahara to Tripoli. Pop. about 3000. See Fourreau in *La Géographie*, Dec. 1900; Jean, *Les Touareg du Sud-Est*, 1909.

Zingerle, Ignaz Vincenz (1825-81), a Ger. scholar and Benedictine monk, b. at Meran. He possessed a wide knowledge of Ger. folklore and auct. mythology.

Zinoviev, Georgy (or Grigory Evseyevich), assumed name of a Russian Communist, b. Sept. 1883 at Elizabetgrad (Zinovievsk), and said to have studied at Bern. Prominent in S. Russia as a Bolshevik in 1903-04. Edited several newspapers. Imprisoned, 1908. With Lenin in Galicia, 1912. At Zimmerwald in 1915, helped to organise Third International. In 1917, in Russia again, assisting with *Pravda* and other papers. In 1919, became President of Third International. In 1924, a letter purporting to come from Z. to the Communists of Britain, inciting to rebellion, was pub. in the London Press, and helped to defeat the Labour Gov. of that year. The original was never produced, and the copies differed. In 1926, Z. was superseded by Bukharin. In 1927 he was ex-

pelled the party; but he made submission in 1928 and is understood to have been re-admitted.

Zinovievsk, formerly Elizabetgrad, renamed Z. after Zinoviev (q.v.), a tn. of the Ukrainian S.S.R. on the R. Ingul, 135 m. N. of Kherson. It is on the Kharkov-Odessa railway, and is the centre of a textile dist. where fruit, especially melons, and tobacco are grown. It has an important local trade in goods imported from Odessa. Many remains of antiquity are found in the neighbourhood. Pop. (1926) 66,686.

Zinzendorf und Pottendorf, Nikolaus Ludwig, Count von (1700-60), a Ger. theologian, b. at Dresden. He founded the colony of Herrnhut for Moravian Brethren (1722), and as a result was banished from Saxony (1736-48). He travelled in Europe and America, reviving and organising the Moravian Church, and wrote many hymns and an autobiography. See Lives by Bovet (1865) and Spangenberg (1772-75).

Zion City, see DOWIE, JOHN ALEXANDER.

Zionism or **Zionist Movement**, the movement for the development of Jewish life and aspirations. It derived its initial impetus from the establishment of the Jewish National Fund in 1901. This was a fund of the masses, with its headquarters in the E. End, of every Jewish community, but it was only about the year 1921 with the setting up in Palestine of a National Home for the Jews that the real work began (see BALFOUR DECLARATION; PALESTINE). The Zionist organisation has two branches, one, the Jewish National Fund, which is primarily responsible for acquiring land in Palestine; the other, the Keren Heyssod, which provides funds for colonisation, education, and allied purposes. There was already in existence another organisation, the Jewish Agency, which was consulted on Jewish affairs by the British mandatory authority in Palestine. In 1927 this organisation, which is not of the same school of thought as the Zionists, but in strong sympathy with it, was enlarged so as to include both Zionists (including Revisionists) and non-Zionists to the end that they might collaborate in the economic development of Palestine and to build the national as well as the spiritual home of the Jews in that country. Zionists thus acquired a predominating influence in Palestine, especially as a considerable amount of land was purchased to the exclusion of the Arabs, and this was no doubt a predisposing cause of the riots of 1929 (see WALLING WALL).

There are two rival conceptions underlying Zionist theory. There are Zionists who, in greater or less degree, envisage the National Home as a political centre, *i.e.* where the Jews shall be influential and numerous enough to assume the self-respect of nationals in a self-sufficing Jewish state; others see in it a cultural centre, *i.e.* where what is specifically Jewish can be given unfettered opportunities for self-development, unharassed by Gentile standards, and become a source of inspiration to world-Jewry. The former regard the acquisition of land and material stability as the essential basis of the National Home; the latter stress the importance of intensive education on Jewish lines. See H. M. Kallen, *Zionism and World Politics*, 1921; U. Ginsberg, *Ten Essays on Zionism and Judaism*, 1922; G. K. Chesterton, *The New Jerusalem*, 1924; P. Horowitz, *The Jewish Question and Zionism*, 1927; J. H. Haynes, *Palestine To-day and To-morrow*, 1930.

Zircon, a mineral of the composition silicate of zirconium, $ZrSiO_4$, which is found in Norway, Ceylon, and the Urals. It forms tetragonal crystals, colourless to yellow, which are very hard (hardness 7.5, sp. gr. 4.7). The yellow Zs. of Ceylon are termed 'jargoons,' and the red-brown varieties are called 'hyacinths.' The best varieties are employed as precious stones. Colourless Zs. resemble diamonds in many ways.

Zirconium, symbol Zr, atomic number 40, atomic weight 91.22, a metallic element which occurs in nature as the silicate (zircon). It has been obtained in two forms, crystalline and amorphous, the former variety requiring a high temperature for its combustion, while the latter burns when gently heated in air. The metal is obtained by heating the fluoropotassium compound with aluminium or sodium. The metal melts at about $1700^{\circ}C$. It resembles silicon chemically. The normal salts are prepared from the feebly basic tetravalent hydroxide $Zr(OH)_4$.

Ziska, or **Zizka von Trocnow**, Johann (1360-1424), one of the most celebrated leaders of the Hussites of Bohemia, b. near his father's castle of Trocnow. In his youth he was gloomy and fond of solitude, and soon left the court, where he had been a page in the retinue of Wenceslaus of Bohemia. He served for a while in the Eng. army, and later fought in Poland and Hungary. In the uproars that followed the death of Huss he was commander-in-chief of the Hussite army, which position he filled with great success. He was buried at Opatowitz.

Zither, a stringed musical instrument plucked with a plectrum, resembling the anct. cithara (*q.v.*). It consists of a flat box which lies on the table, strung with five metal strings passing over frets, and from twenty-seven to forty strings of various kinds played as open strings, plucked with the fingers, to form the accompaniment to the melody which is played with the plectrum on the strings nearest the performer. It is the most popular instrument of Bavaria, Styria, and Tyrol, for it is played by all classes and no inn is without one.

Zittau, a tn., Saxony, Germany, on the Mandau, 48 m. E.S.E. of Dresden; manufs. textiles and pottery. Lignite is mined. Pop. (1925) 38,353.

Zittel, Karl Alfred von (1839-1904), a Ger. geologist and palæontologist, b. at Bahlingen in Baden. His chief work was *Handbuch der Palæontologie*, which was completed in 5 vols. in 1893, but he also pub. *Aus der Urzeit*, 1873; *Die Sahara*, 1883; *Über den geologischen Bau der Libyschen Wüste*, 1880, an account of the Rohlf's expedition to the Libyan desert; and *Geschichte der Geologie und Palæontologie bis Ende des 19 Jahrhunderts* (1899), a monumental history of the progress of geological science. He was professor of palæontology in the University of Munich in 1866, to which was added the chair of geology in 1880. He was also appointed director of the natural history museum there, and from 1899 was president of the Royal Bavarian Academy of Sciences. Z. was regarded as a distinguished authority both on geology and palæontology, and from 1869 till his death was the chief editor of the *Palæontographica*.

Ziusudra. A Babylonian deity and the hero of the Babylonian accounts of the Flood. In anct. times he was called either Z., a Sumerian name which appears in Gk. authors as Xisuthros, or Uta-napishtim, an Akkadian name of uncertain meaning. Z. was the son of Ubar-Tutu, who was reckoned the last of the eight kings who reigned over five different cities before the Flood. He figures as the hero of a Babylonian poem (which survives only in fragments) on the Flood, which seems to confirm the story of that event as related in the Gilgamesh Epic. According to this poem the god Enlil, disturbed by the loud laments of the human race over their wretched lot, decided, contrary to the wish of Ea, the god of wisdom, to destroy the human race by a flood (*abubu*). Ea then went to his worshipper Ziusudra's house at Shuruppak, known to be situated at a site now called

Fara, and warned Z. to build a ship. The story (see also *DEUGGE*) in fact is very similar to the biblical version, but the theological basis is different; for Ea is made to explain to Enlil that he had planned the building of the ship by Z., because the sending of the flood was a wrongful act in that the guilty and innocent suffered alike and that neither wild animals nor a famine could have caused such universal destruction. The Babylonian story ends with Ea going to the ship, blessing Z. and his family, and decreeing that he and his wife shall have eternal life and dwell on an island 'at the mouth of the rivers,' which could only be reached by travelling westwards from Mesopotamia ('the land between the rivers') and crossing the 'waters of death.' Thus Z. became a deity.

Zlatoust, or **Slatoust**, a tn. in the Ural Area, Soviet Russia, 147 m. N.E. of Ufa, with iron foundries and machinery works. Pop. 22,000.

Znaim, now **Znojmo**, a tn. in Moravia, Czechoslovakia, on the Thaja. It has the ruins of an old castle and a rathaus. Earthenware is manufactured. The armistice of Z. was concluded here after the Battle of Wagram between the Fr. and Austrians, 1809. Pop. 21,325.

Zoan, see **TANIS**.

Zobeide, **Zobeyda**, or **Zubadie**, the wife of Haroun-al-Raschid (*q.v.*). Very little is known of her life, but she is credited with having founded the city of Kashan in Irak prov., Persia. A notable relic in Iraq to-day is the tomb of Z., located on the burying-ground which eventually extended over land once occupied by the streets of Bagdad. This tomb is built of brick and is octagonal in shape. It is surmounted by a superstructure in the form of a cone. Originally built in A.D. 827, it is said to have been frequently restored. Z. is the reputed authoress of the *Thousand and One Nights* and figures in the *History of Zobeide* and in the *Ganem, the Slave of Love*.

Zodiac, a belt of the celestial sphere 16° wide, extending for 8° on each side of the ecliptic. Its antiquity is very great, and the region was noted by different peoples independently, a fact explained by its containing all the known heavenly bodies with proper motions, the sun, moon, and planets. The division into twelve signs, each extending over 30°, served to mark divisions of the year, each being marked by the entry of the sun, in his westward course, into a group of stars. The names have a seasonal significance intermingled with myth, and differ from the Chinese, Hindu, Chaldean, Egyptian, Gk., and

Aztec. As the sun in spring passes the middle of his ascent he travels through Aries, ♈; Taurus, ♉; and Gemini, ♊, respectively; at the solstice he is in Cancer, ♋, then commences his descent through Leo, ♌, and Virgo, ♍, these three marking the summer; Libra, ♎, Scorpio, ♏, Sagittarius, ♐, are then passed through in autumn; Capricornus, ♑, is occupied at the beginning of winter, Aquarius, ♒, and Pisces, ♓, being traversed in the first part of the ascent. The 'ascending' signs are thus those of winter and spring, the 'descending' those of summer and autumn. The tropics of Cancer and Capricorn are circles of latitude vertically under the sun at the solstices when it is in those signs. The signs do not now agree with the constellations bearing their names owing to precession (*q.v.*). Aries is in Pisces, and so on, the signs 'backing' into constellations to the W.

Zodiacal Light, a faint haze of light extending from the sun along the ecliptic, visible just after sunset or before sunrise as a cone extending above the sun's place into the sky. It is best seen in the evening about the vernal equinox, when the eastern portion of the ecliptic is most nearly perpendicular to the horizon; in the morning at the autumnal equinox, the western portion being then most so inclined. It is for these reasons best seen within the tropics, when it can be observed under favourable conditions right across the sky. Here the counter-glow or *gegensehein*, a bright patch of a few degrees in diameter, is seen exactly opposite the sun. The brightness of the Z. L. is sometimes quite conspicuous, though less so than the Milky Way. The spectrum is continuous, without bright lines, but too faint to show dark lines if they should be present. At the horizon it is 20° to 30° broad, and it extends to within about 10° of the zenith. It is most generally supposed to be due to sunlight reflected from clouds of meteoric bodies extending in a flat disc round the sun to the plane of the solar equator, and beyond the earth's orbit. It has been photographed by Dr. Wolff and A. E. Douglass. Another theory considers it as an extension of the corona and of an electrical nature. Dr. Abbott likens it to the nebulosity visible in the Pleiades, and Seillier considers it possible that Leverrier's observed perturbation of Mercury may be due to the portion within that planet's orbit.

Zoffany (or **Zoffani**), **Johann** (1735-1810), a Ger. artist, a friend of Sir Joshua Reynolds, b. at Ratibon. He settled in England (1758), and

became an R.A. (1768). His works include portraits of Garrick and other famous contemporaries, and 'Embassy of Hyder Alee to Calcutta,' etc.

Zogu, Ahmed, see ALBANIA.

Zohar, or Sohar, see CABBALA.

Zoilus, a grammarian, was a native of Amphipolis, and flourished in the time of Philip of Macedon. He was celebrated for the asperity with which he assailed Homer, and his name became proverbial for a captious and malignant critic.

Zola, Emile Edouard Charles Antoine (1840-1902), a celebrated novelist and journalist, b. in Paris. His mother was a Frenchwoman, and his father, François Z., a soldier and civil engineer, was of mixed Italian and Gk. descent. The death of his father left Z. and his mother in poor circumstances, and but for the help of relatives his educational facilities would have been much less than they were. He early showed his taste for literature by writing when at school a comedy entitled *Enfoncé le Pion* (Making a Fool of the Usher). On leaving school he worked as a clerk, and later in the publishing house of Hachette. He was then writing articles for *Le Petit Journal*, stories for *La Vie Parisienne*, and also a series of critical papers for *Le Salut Public* of Lyons, which were subsequently pub. in book form as *Mes Haines*. He also wrote literary and art criticisms for the *Événement*, but turned his attention to novel-writing. His novels fall into two well-marked classes: first, the sensational and the novels of the Rougon-Macquart series, in which, as an exponent of realism, Z. proved himself the master of his age. Cruelly poignant is *L'Assommoir*, in which he graphically describes, without the slightest regard for convention, the results of drink upon the fortunes of an artisan family. The second class of his works subordinates characterisation, and, indeed, the story, to the inculcation of Socialist philosophy. The *Four Gospels* and *Fécondité* and *Travail and Vérité* exemplify this aspect of his work. The Rougon-Macquart series includes, among others, *La Fortune des Rougon*, *Le Ventre de Paris*, *La Conquête de Plassans*, *L'Abbé Mouret*, *L'Assommoir*, *Nana* (the narrative of a fille de joie), *Pot-Bouille*, *La Joie de Vivre*, *Germinal*, etc., etc. Perhaps his best-known work is *La Débâcle*, a story of the bitter humiliation of France in the war of 1870. He earned the gratitude of all opponents of anti-Semitism by his challenge to the Fr. Gov. to give Dreyfus a hearing—a challenge which appeared in the *Aurore* in the form of the cele-

brated manifesto *J'accuse*. He d. under strange circumstances in his home, where he was found asphyxiated by the fumes of a charcoal stove.

See G. de Maupassant, *E. Zola*, 1883; R. H. Sherard, *Zola: a Biographical and Critical Study*, 1893; A. E. Vizetelly, *E. Zola: Novelist and Reformer*, 1904; M. Josephson, *Zola and his Time*, 1929; H. Barbusse, *Emile Zola*, 1932.

Zollverein, the Prussian or Ger. customs union, founded through the efforts of the government of Prussia in 1834, and having for its object the establishment of a uniform rate of customs duties throughout the various states joining the union. The Z. was the decisive event in Ger. commercial policy, and led directly to Ger. national unity. By it protection was limited to 10 per cent. on manufs. and a uniform duty of 1s. 6d. per cwt. was imposed on all goods. The Anglo-Fr. treaty of 1860, however, resulted in a reversion towards free trade and a treaty with England, as a consequence of which the import duty of 1s. 6d. was abolished together with certain corn and other duties. The word is also now used in a general sense to denote any customs union. See **TARIFF**.

Zombor, or **Sombor**, a tn. of Yugoslavia, in the Danube banat, formerly a royal free city of S. Hungary. It is connected by canal with the Rrs. Danube and Theiss, and is an important market. Pop. 31,332.

Zonaras, Joannes, a Byzantine historian and theologian of the twelfth century, who wrote a *Chronicon*, or history from the Creation down to the year 1118. (See edition by Du Cange, 1686.) Originally the private secretary and commander of the imperial guard of Alexius Comnenus, he became a monk and d. in seclusion at Mt. Athos.

Zone, geometrically, the portion of the surface of a sphere intercepted between two parallel planes. The earth's climatic Zs. are determined by planes at the Arctic and Antarctic circles, and the tropics of Cancer and Capricorn. The resulting Zs. are known as the frigid, consisting of the polar caps; the torrid, between the tropics; the temperate, between the frigid and the torrid. They merely mark out the incidence of the sun's radiation, and are only useful as determining that factor, rather than as giving any clue to actual climate. Actual thermometric observations have led to the establishment of *thermal zones* between certain isotherms. The equatorial or tropical regions are marked by climate and vegetation arranged in *vertical zones* between different heights above sea-

level. In astronomy, star-catalogues are based on Zs.: Bessel's, of 64,000 from decl. -15° to $+45^{\circ}$; Argelander's, of 40,000, from -31° to $+80^{\circ}$; Gould's, of 73,160, from -23° to $+80^{\circ}$. The *Internat. Astro. Cat.* and the *Cape Photograph. Durchmusterung* are arranged in Zs. of 1° .

Zone System, a method of arranging railways in zones from a central point, for the purpose of simplifying railway fares. Thus the fare for any distance up to 10 m. is uniform; from 10 m. to 20 m. an addition is made, and so on; so that a person travelling 20 m. pays the same fare as one travelling only 11 m., and thus travels at his expense.

Zoning is a term first used in American city-planning, and now generally adopted in Great Britain and elsewhere, to describe the allocation of areas of land in town-planning schemes for certain specific uses, such as housing, commerce, industry, agriculture, open spaces, etc. These areas are not 'zones' or belts of land, but land considered suitable for particular uses, and from which it is considered desirable to exclude buildings erected for other uses; or land upon which buildings erected may not exceed a certain height, or occupy less or more than a certain superficial area. In Great Britain zoning can be enforced under the provisions of a town-planning scheme. American city-planning is mainly based on zoning ordinances. The principle of 'zoning' has been applied in Germany and some other continental countries for many years.

Zoo-Geography, see GEOGRAPHICAL DISTRIBUTION.

Zoological Society, in Eng., a society for the promotion of the study of animal life. Its Zoological Gardens (the Zoo), comprising over 30 acs. in Regent's Park, London, were opened in 1828, and in 1834 the king's menagerie was transferred to it from the Tower of London. The Zoo has a magnificent collection of living animals admirably housed, and cared for with the utmost skill. Recent improvements include the Mappin Terraces, occupying a quadrant-shaped area, in which the animals are seen in tiers of enclosures, an additional insect-house (1913), Monkey Hill, and an aquarium, opened in 1924. A country annexe to the Zoo was opened in 1931 at Whipsnade Park. (See WHIPSNADE.) The Society meets frequently to discuss zoological topics, and publishes quarterly *Proceedings*. See Scherren, *The Zoological Society of London*.

Zoology, a branch of biology concerned with the study of animals and subdivided into many divisions, such as embryology (q.v.), histology (q.v.), anatomy (q.v.), and morphology (q.v.),

which last deals with the form of the animal as a whole. The study of form is correlated with that of the functions of the parts, that is, with physiology (q.v.), a very extensive field intimately connected with biochemistry (q.v.), nutrition, metabolism (q.v.), locomotion, irritability, growth (q.v.), and reproduction. These studies, combined with those of geographical distribution (q.v.) and of ecology (q.v.), lead to an appreciation of the relation of the animal to its environment. In addition to distribution with regard to latitude and longitude, distribution above or below sea-level must be considered (see MARINE BIOLOGY and PLANKTON).

Comparison of animals of the same species shows that there is a variation which is probably due either to heredity (q.v.) or to the influence of environment. (See EUGENICS; EVOLUTION; LAMARCKISM; MENDEL.) Fossilised remains of animals show that evolutionary changes have occurred through long periods of time, and palaeontology yields some elucidation of problems arising in the study of recent species. Animals are classified in two main groups, the Vertebrates (q.v.) and the Invertebrates (q.v.). These are divided into numerous phyla, which are again subdivided. The chief phyla are: (1) Protozoa (q.v., also PARASITOLOGY and TROPICAL MEDICINE), unicellular organisms (all other phyla are Metazoa, multicellular animals); (2) Porifera (Sponges, q.v.); (3) Coelenterata (including corals, jelly-fish, sea anemones, q.v.); (4) Platyhelminthes, the flat-worms (see CESTODA; TAPE-WORMS); (5) Nematahelminthes, the thread-worms, hook-worms, and arrow-worms (see BILHARZIASIS, FILARIASIS, NEMATODES, and TROPICAL MEDICINE); (6) Trochoelminthes, including the rotifers; (7) Molluscoida (see PHORONIS); (8) Echinodermata (q.v.); (9) Annelida or Annulata (see EARTH-WORMS); (10) Arthropoda, including the classes Crustacea (q.v.), Onychophora (q.v.), Myriopoda (q.v.), Insecta (see ENTOMOLOGY; INSECTS; INSECT BITES AND STINGS; LOCUST; MOSQUITOES; PARASITOLOGY; SAND-FLY FEVER), and Arachnida, the spiders (q.v.); (11) Mollusca (see MOLLUSCS), including the snails, mussels, oyster, octopus; (12) Chordata, animals with a notochord that may persist throughout life or be replaced by a vertebral column. There are three sub-phyla, the Hemichorda, including Balanoglossus (q.v.), the Urochorda, the Ascidia, and the Euchorda; the last two constitute the Vertebrata. The Euchorda are divided into the Acrania (the Lancelets; see AMPHIOXUS) and the

Craniata, including the Cyclostomata, Pisces, Amphibia, Reptilia, Aves (see BRD), and Mammalia (see MAMMALS). See also under separate headings. Consult *The Cambridge Natural History*; G. R. De Beer, *Vertebrate Zoology*; O. H. H. Latter, *Elementary Zoology*; Sir A. E. Shipley and E. W. MacBride, *Zoology*; Sir J. A. Thomson, *Outlines of Zoology*.

Zoospore, see SPORE.

Zorndorf, a vil. of Prussia in the prov. of Brandenburg, famous as the scene of the defeat of the Russians by Frederick the Great in 1758.

Zoroastrianism, the religion of the Persians, introduced by Zoroaster or Zarathushtra, who probably lived about 800 B.C. He was either a Mede or a Bactrian, and was evidently a man of extraordinary personality. Tradition that has gathered around his life speaks of miraculous signs at his birth, his great wisdom even as a child, whereby he was able to confound the Magi, and of his being borne up to the highest heaven and given the sacred word of life from the Deity. He commenced teaching at the age of thirty, after many years spent in contemplation, and d. at the age of seventy-seven. The religion he founded was the national religion of the Persians from about 550 B.C. to the middle of the seventh century A.D. At this time Persia was invaded by the Mohammedans, and the faithful followers of Zoroaster fled to India, and are now represented by the Parsees (q.v.). Z. is based on a dual conception of a good principle, *Ahura Mazda*, and an evil one, *Angra Mainyu*, who are in conflict, and must be until the end of the period ordained by the *Ahura Mazda* for the duration of the world. Z. was a practical, ethical doctrine inculcating active charity, kindness to animals, and moral conduct generally. The central feature of Zoroastrian ritual was fire worship, as with the Parsees (q.v.), together with elaborate methods of preventing defilement. Each man, according to Z., had a free will, conscience, and a soul, and a guardian spirit or prototype of himself who dwelt above, and was called a *fravashi*—being really his own character put into a spiritual body. Having the choice of good and evil, man naturally has to suffer the punishment of sin. After death for three days the soul hovers about its earthly abode. During this time funeral rites are performed. Then on the fourth day *Sraosha* carries the soul aloft, demons endeavouring to gain his burden. The fires lit by the friends of the deceased are supposed to keep these evil spirits in check. Arriving at the bridge between earth

and heaven, *Mithra* and *Rashmu* cast up the soul's good and bad deeds. Then, having done penance for the bad ones, the soul crosses. If it be fit for heaven the bridge is broad and easy to cross, but, if not, then the bridge seems but a hair's breadth, and it falls into the gulf beneath. Those who cross pass into everlasting light. Zoroaster tells of a 'far-off divine event' which will be heralded by signs and wonders. For 3000 years beforehand periods of peace and overpowering evil will alternate, and at last the great dragon will be loosed, and a fearful time ensue until Mazda sends a man who will slay it. The saviour, *Sraoshyant*, will be born of a virgin, the dead will arise, the sheep will be divided from the goats, and the wicked destroyed by a flood of molten metal which will leave the good unharmed. Mazda and Sraosha will then overcome Ahriman and the dragon, and everlasting growth and life will take the place of age, decay, and death. See M. N. Dhalla, *Zoroastrian Civilisation*, 1922; J. H. Moulton, *Early Zoroastrianism* (new ed. 1927); A. V. W. Jackson, *Zoroastrian Studies*, 1928; J. D. C. Pavy, *Zoroastrian Doctrine of Future Life*, 1929.

Zorrilla y Moral, José (1817-93), a Spanish poet and dramatist. Born at Valladolid; studied for the law at Toledo and Madrid, but soon devoted himself to literature. He visited Mexico during 1885-86. His works include an elegy on the death of Larra, 1837; *Juan Dandolo*, a play in collaboration with García Gutiérrez, 1839; *Cantos del Trovador*, 1841; *Granada*, an incomplete epic, 1852; *El Zapatero y el Rey*, a comedy, 1840; and *Leyenda del Cid*, 1882.

Zosimus (c. 408-450), a Gk. historian, a native of Constantinople. His chief work is *Historia Nova*, a continuation in six books of the history of Dexippus, extending up to the year 410. It forms a valuable authority for the fourth century, and is clear and concise. The author was a strong opponent of Christianity. See editions by Mendelssohn (1887).

Zouaves, a body of troops in the Fr. army, so called from the Kabyle (Algeria) tribe of Zwawa, from whom General Clausel formed a regiment in 1830. These native troops were at first officered by Frenchmen, and a certain number of Frenchmen were included in the ranks, but this proved unsatisfactory, and the native element gradually died out. The Moorish dress is still maintained, and there are now four Zouave regiments, formed from picked veterans from infantry regiments.

Zoutpansberg ('Salt-pan Mountain'), a range of mountains in a dist.

of the same name, N.E. Transvaal, near R. Limpopo, and the source of many of the tributaries of that riv. The range is a continuation of the Drakensberg, and the height ranges from 3000 ft. to 4500 ft. In the dist. are some important goldfields. The chief tns. are Leydsdorp and Pietersburg, round which are some rich coal and copper mines.

Zuccarelli, Francesco (1702-88), an Anglo-Italian painter, b. at Pitigliano in Tuscany. He settled as a young man in England, and soon won great fame by his landscapes and as a scene-painter at the London Opera House; while he was among the original members of the Royal Academy, founded in 1768. The Glasgow Municipal Museum has a large array of his best works.

Zuccaro, Federigo (1543-1609), an Italian painter, b. at Sant' Angelo; brother and pupil of Taddeo Z. He came to England in 1574 and found various patrons among the nobility, but in 1578 returned to Italy. A fine portrait of Queen Elizabeth, now at Hatfield House, is commonly ascribed to him; while the Glasgow Municipal Museum has a picture which is certainly his, and several others are in the National Gallery—for instance, one of the Earl of Leicester, and another of Sir Walter Raleigh. He completed Vasari's 'Last Judgment' in the dome of Florence Cathedral; carried out some of Michelangelo's designs for the Pauline Chapel; and decorated the Doge's Palace at Venice (1582) and the Escorial (1585-88). In 1595 he founded the academy of St. Luke at Rome.

Zug: (1) A canton of Central Switzerland. Area 92 sq. m. S. and S.E. are mountainous, the highest peak being the Kaiserstock (8258 ft.). The rest is in the basin of the Reuss, and, possessing suitable grazing and pasture, produces butter, cheese, etc. Pop. (1930) 34,406. (2) A tn., cap. of above, on Lake Zug. Pop. 8000.

Zuider, or Zuyder, Zee, an arm of the North Sea, penetrating into the N.W. Netherlands. Area 2027 sq. m. It consists of an oval inner part and a horn-shaped outer part, joined by a strait about 10 m. wide. A chain of islands—Texel, Vlieland, Terschelling, Ameland, and Schiermonnikoog—separate it from the North Sea, and are the remains of the original coastline. The Zuider Zee was formed in the thirteenth century by the sea breaking through the sand dunes on the coast and flooding the lowlands between it and a small inland lake, with which the floods united. The Zuider Zee is very shallow, the depth

never exceeding 40 ft. and being only 3 ft. over large areas. It contains several islands and receives the R. Yssel. A state drainage scheme for reclaiming the inner portion is in progress. See LAND RECLAMATION.

Zuloaga, Ignacio, Spanish painter; b. July 26, 1870, in Eibar, prov. of Guizuzcoa; son of Placido Z., metal-worker and damascener. Intended for an architect, went to Rome to study: took to painting instead. Self-taught. Recalls Velasquez. Works include: 'Daniel Zuloaga and his Daughters,' 1899 (Luxembour); 'Promenade After the Bull-Fight'; 'Spanish Officers'; 'Segovians Drinking'; 'El Coriano'; 'The Penitents.'

Zululand, a dist. of S. Africa, since Dec. 30, 1897, a prov., occupying the N.E. coastal region, of Natal. Area 10,461 sq. m. It includes Tongaland, and is bounded by Vryheid on the W., Swaziland and Mozambique on the N., Natal proper on the S., and the Indian Ocean on the E. and S.E. The surface is mainly mountainous, but is much flatter in the N.E., especially Tongaland and Umbomo, where there are large shallow lakes with small outlets to the sea. It is watered by the Tugela, which for about 100 m. forms its southern boundary, the Blood R., a tributary of the Tugela, forming the western boundary, Umbalusi, Umvolosi, and Mkusi Rs. The Mkusi flows into the large shallow St. Lucia Lake, and finds its way to the sea at St. Lucia Bay with the Umvolosi R. There are large forests, and the land is very fertile. Sugar is the most important product and is exported in quantity; tea, cereals, especially maize, fruits and vegetables are grown, as well as beans, cotton, and coffee. Stock-raising is a growing industry. Very little land is handed over to Europeans. Most of it is crown land, held as native reserves by the Zululand Natives Trust. Twenty-one reserves occupy an area of over 6000 sq. m. The mineral wealth is still largely unworked, but there are considerable gold deposits in the S. The climate is healthy except on the coast, where fever is prevalent, the rainfall averaging about 40 in. per year. The flat, swampy coast-land is unfortunately not navigable. Chief tn. Ulundi, on the Umvolosi R. A railway runs along the coast from Durban to the St. Lucia coalfield, W. of the St. Lucia Lake, otherwise there are no railways in Z. The roads are on the average good. There are telegraph and telephone services, for the most part confined to the gov. offices. Z. is in the process of being opened up and promises to be very

productive. Sugar-cane and maize grow near the coast, and the High Veldt is suitable for stock-raising, but both High Veldt and Middle Veldt are handicapped by the lack of transport. Pop. about 180,000, including 2000 Europeans. For history see ZULUS. Consult *Natal Province Official Handbook*, 1911.

Zulus (*Amazulus*), a S. African people belonging to the Bantu stock. Both physically and intellectually they are a fine race. They are advanced in domestic arts, and their main industries are pastoral, though iron work, pottery, copper, ivory, horn and wood ornaments, and baskets are made and hides are tanned. The men are of a warlike temperament and exhibit a notably 'sporting spirit.' The standard of morality is high in spite of the universal practice of polygamy. There is an extensive folklore and the unwritten code of laws is well observed. Gov. is by chiefs, through the heads of dists., and the constitution is thoroughly democratic. The importance of the nation dates from the beginning of the nineteenth century, when it was organised and led through a series of victorious campaigns by the chief Chaka, who practically became master of S. Africa from Cape Colony to the Zambesi. He was murdered in 1828 and was succeeded by his brother, Dingaan, who in 1838 brought about a war with the Boers, by whom he was defeated. The next rulers were Umhanda (*d.* 1873) and Cetywayo, during whose reign war broke out with Great Britain. (See ZULU WAR (1879)). Cetewayo's son, Dinizulu, granted a strip of land to the Boers on which they established the 'New Republic,' while the remainder of Zululand was annexed to Great Britain in 1887. Dinizulu was exiled in 1888 as a result of a rebellion, and another rising under Bambaata was suppressed in 1906. Dinizulu *d.* in 1913. See T. B. Jenkinson's *Amazulu*, 1882; J. Stuart's *History of the Zulu Rebellion*, 1913; G. R. Hance, *The Zulu, Yesterday and To-day*, 1917.

Zulu War (1879), arose out of Zulu-Boer disputes over the possession of lands on the Transvaal border. These disputes came to a head in 1878, when Cetywayo was king of the Zulus. British relations with the Zulus from 1840, when the Eng. occupied Natal, till now had been those of a complete if curious amity—like those between a wild beast and its keeper. The Zulus acknowledged a sort of filial subordination to their comparatively weak neighbours, mainly because

of their difficulties with the Boers, with whom their relations were always of the worst. Chaka, the founder of the Zulu dynasty, and a kind of sanguinary African Napoleon, was not unfriendly towards the Eng. His immediate successors were the bloodthirsty Dingaan, the terror of the Boers, and Panda (*d.* 1872), who owed his throne to an alliance with the Boers. Panda was succeeded by Cetywayo, who had been virtual ruler since 1856. Cetywayo had derived a cruel military system from his predecessors, which he maintained by an arbitrary exercise of force. Yet little fault was to be found with the loyalty and friendliness of Panda or of his son Cetywayo with the British of Natal. When, however, the Transvaal was annexed, Cetywayo undoubtedly expected that the British would do justice to him as he conceived the case, on the subject of the land disputes which had been so bitter a source of contention between him and the Boers. But Sir Theophilus Shepstone, after his appointment as Administrator of Transvaal, became a convert to the Boer claims, and to this change of view the war was largely attributable. At first Shepstone, at a conference with the Zulu prime minister and the Indunas of the Blood River, offered to give up part of the disputed land and to buy from Cetywayo at a fair price all his claims; but later he seems to have come upon evidence which convinced him that the Zulu claim was unfounded, and Sir Bartle Frere, the High Commissioner, was led to take the same view. In 1878 an inquiry by the Attorney-General of Natal on rival claims to land E. of the Blood River and S. of the Pongolo resulted in the Boer documentary evidence being found worthless, but the Boers were allowed to remain on this land by a merely prescriptive title. In the result, Frere, though taken by surprise—for he had expected a decision on title adverse to the Zulus—confirmed the Boers in possession, giving Cetywayo the empty shadow of sovereignty. Frere then sent an ultimatum to Cetywayo calling upon him to disband his army and justified this demand on the ground of the oppressive rule of the Zulus. Thus began the war, for Cetywayo spurned the demand. It may be noted here that the name of Theophilus Shepstone—known to the natives as 'Somtseu,' the 'father of his people'—is revered both in Natal and Zululand to this day, for he directed native policy in Natal for thirty years with almost uninterrupted peace, the secret of his power lying in the fact that he allowed

the native to retain his tribal customs as far as might be consistent with humanity. The war, however, came in the last years of his administration. The British crossed into Zululand in five columns. One of these was promptly cut up at Isandhlwana—near a grotesquely-shaped hill called 'Isandhlwana,' which means in Zulu 'The Claw.' This defeat was followed by the great epic of Rorke's Drift—a handful of men behind an improvised barricade of packages and biscuit-boxes holding out all night. Lieutenants Chard and Bromhead, the commanders, became national heroes, and the place of their remarkable defence may be seen to-day—85 m. due N. of Pietermaritzburg. But the white farmers were now trekking away from the attacking Zulus. Panic set in, and was not allayed until the issue was decided. The Zulus were finally crushed at Ulundi in 1879 at the 'battle of the iron-sheet fort,' as the Zulus called it, because the flash of the bayonets on the sides of the infantry square gave them the impression of four metal walls. Cetwayo fled towards the Black Umvolosi River, but was captured by dragoons near the Great Ingome Forest and sent into exile, where he died. Consult F. W. Chesson, *The War in Zululand: A Review of Barile Frere's Policy*, 1879; H. Mason, *The Zulu War: Its Causes and its Lessons*, 1879; Hedley A. Chilvers, *The Seven Wonders of Southern Africa*, 1929. For Cetwayo's story of the Zulu nation and the war see *Macmillan's Magazine* for Feb. 1880.

Zumala-Carreguy, Tomas (1789–1835), a Spanish general, b. in Guipuzcoa. He fought under Mina against Napoleon and under Quesada, and rose to be a colonel. In 1832 he was dismissed from the army as a Carlist, and in 1833 became leader of the Carlist forces in the Basque Provinces, gaining many victories over the Cristinos.

Zumpt, August (1815–77), a Ger. philologist, nephew of Karl Zumpt, b. at Königsberg and educated at Berlin. He was a lecturer at various gymnasia in Berlin. His works, mainly dealing with Latin epigraphy, include *Studia Romana: Das Kriminabrecht der römischen Republik*, and *De Monumento Ancyrano Supplendo*.

Zumpt, Karl Gottlob (1792–1849), a Ger. philologist, b. at Berlin; studied there and at Heidelberg. In 1827 he was appointed extraordinary professor of Latin literature at Berlin, and in 1836 ordinary professor there. He issued a famous *Lateinische Grammatik*, 1818, and edited Quintus Curtius Quintilian and several works

of Cicero, besides writing valuable works on classical subjects.

Zungaria, or Dzungaria, a mountainous region of Sin-kiang, China, bordering on Russian Turkestan, and lying between the Tian-Shan on the S., the Greater Altai on the N., and the Mongolian Gobi on the E. The surface is mainly a desert and slightly hollowed plateau, but there are large tracts of forest, and the plains and valleys afford good pasturage, while cereals are grown in parts. There are numerous mountain streams, but the only important rivs. are the Black Irtysh and the Ili. The minerals include gold, copper, iron, and salt. The country was conquered by the Chinese emperor in the eighteenth century. The inhabitants include the Kalmuck Dzungars and Turgots, and also Khalkas and Dungans, Chinese and Kirghiz.

Zunz, Leopold (1794–1886), a Jewish scholar, b. at Detmold, Germany; studied at Göttingen and Berlin. He held several educational posts in Berlin. His works include: *Elvas über die rabbinische Litteratur*, 1818; *Die gottesdienstlichen Vorträge der Juden*, 1832; and *Die Namen der Juden*, 1836.

Zurbaran, Francisco (1598–1662), a Spanish painter, a native of Fuente de Cantos. His family were peasants, but growing interested in art he soon left his humble surroundings and went to Seville. In 1625 he was engaged to paint an altar-piece for the cathedral there; while in 1650 he was appointed one of the painters to the king, Philip IV., and in consequence the rest of his life was spent chiefly at Madrid. Many of his pictures are still in that tn., while others are in the Louvre, the Pinakothek, and the National Gallery of Scotland; and nearly all of them are marvels of technical accomplishment, yet do not proclaim the artist gifted with any great imaginative faculty.

Zürich: (1) A canton of N. Switzerland, bordering on Baden. Area 667 sq. m. Its northern part is open and undulating, while the central and southern portions are very mountainous with summits rising to 4000 ft. It forms part of the basin of the Rhine and is also drained by the Töss, Glatt, Limmat, Thur, Sihl, and Reuss. The greater part of Lake Zürich lies within the canton. Agriculture is carried on in the N., and there are manufs. of various kinds. Pop. (Ger. and Protestant.) (1930) 616,961. (2) Cap. of above canton, situated at the exit of the Limmat from Lake Zürich, 60 m. N.E. of Bern. The old part is very picturesque, and the tn. has a fine cathedral and a famous university and poly-

technic. It is an important manufacturing and commercial centre, and produces silk, cotton, paper, and machinery. Pop. (1930) 249,130. See M. D. Hottinger, *Basle, Berne, and Zürich* (Mediaeval Towns Series), 1932.

Zutphen, a tn. of prov. Guelderland, Netherlands, at the confluence of the Yssel and the Berkel, 18 m. N.E. of Arnhem. It contains some interesting buildings, Groote Kerk, Wijn Huis Tower, etc., and near it is the scene of Sir Philip Sidney's death in 1586. Pop. 21,000.

Zuyder Zee, see **ZUIDER ZEE**.

Zvenigorodka, a tn. of the Ukrainian S.S.R., 100 m. S. of Kiev. Pop. about 40,000.

Zweibrücken (Fr. *Deuxponts*), a tn. of Bavaria, Germany, on R. Schwarzbach, 45 m. W. of Landau, formerly cap. of the anct. duchy of Z. It has numerous manufs. and a famous printing-press. Pop. 16,000.

Zweig, Arnold, one of the greatest modern Ger. novelists, was b. in Glogau, 1887. Studying for the Bar and practising law, he soon also turned his attention to literature. His first book was a romance called *Notes about the Family Klopfer*. It deals with the rise of a Polish Jewish family which emigrated into Germany, and is in part autobiographical. He followed this up with *Die Novellen um Claudia*. But he secured full European and American recognition in 1929 with his famous novel of the Great War, *The Case of Sergeant Grischa*. Here we have not the reminiscences of a single soldier at the war, but a wide canvas showing the whole movement of the vast Ger. army on the Russo-Polish front and a bitterly-etched picture of a general who is presumably to be identified with Ludendorff. It is announced that 'Grischa' is but one of a series of four to deal with the time immediately before the war, during the war, and the days that followed.

Zweig, Stefan, Austrian author, b. at Vienna, 1881, has already acquired not only in Ger.-speaking countries a great reputation as writer of short stories and incisive studies of great personalities, but has also achieved a wider public in Fr. and Eng. translations. His best piece of fiction is *Amok*, which appeared in 1923. Most of his long studies on Balzac, Casanova, Stendhal, Tolstoi, Dickens, Dostoevsky, Hoelderlin, Kleist, Nietzsche, Mrs. Eddy and Freud have been translated into many European languages. Living for the most part at Salzburg, he has gradually attained an immense influence on the Continent. Other works in

Eng. trans. are *Conflicts* (tales), 1928; *Jeremiah*, a drama, 1929; *Joseph Fouche*, 1930.

Zwickau, a tn. of Saxony on R. Mulde, 60 m. S.W. of Dresden. Among its interesting old buildings are the Marienkirche (1451), the fourteenth-century Katharinenkirche, the Town Hall (1581), and the Gewandhaus. It is near large coal-fields, and is an important industrial centre, with numerous manufs. Pop. (1925) 80,358.

Zwingli, Huldreich, or **Ulrich** (1484-1531), a Swiss reformer, b. at Wildhaus, St. Gall, and educated at Bern, Vienna, and Basel. In 1506 he became parish priest at Glarus, and in 1512 and 1515 went on foreign service as chaplain to Swiss troops let out as mercenaries. For this service he received a pension from the pope. In 1516 he became preacher to the Benedictine monastery at Einsiedeln, where he began to declaim against the pilgrimages to that famous shrine of the Blessed Virgin. In 1518 his amours with a profligate became public, and he left Einsiedeln for Zürich, where he opened his reforming career by attacking a Franciscan indulgence preacher, Bernadhin Samson. His activities now paralleled for a while those of Luther. The Bible became his sole rule of faith, Mass was abolished, shrines were desecrated, sacred images destroyed. The civic authorities supported the movement, and religious disputations were acclaimed as victories for the reformer. In 1524, however, bitter controversy broke out between the German Lutherans and the Swiss Zwinglians on the matter of the Holy Eucharist. For the latter it was merely a commemorative meal, while Luther insisted on a real presence of Christ's body and blood in the consecrated elements, and the breach was only widened by the conference at Marburg (1529), arranged by Philip of Hesse. Z. took an active part in the war between Zürich and the Forest Cantons and was killed at Cappel, where his party met with a disastrous defeat. See his *Opera*, edited by Schuler and Schulthess (1828-61), and *Lives* by Oswald Myconius (1532, reprinted by Neander 1841), Christoffel (1857), and Mörikofer (1867-69).

Zwinglians, the name which was given to the disciples of the reformer Zwingli, and consequently to the Reformed Churches of German Switzerland in general. Owing to their controversy with the Lutherans concerning the real presence in the Eucharist, they were also called Sacramentarians. But the name which they themselves assumed was that of Evangelicals, which after a

time displaced the other two. They are also called by the name of Reformed Churches of Switzerland as distinct from that of Protestants, which applies more particularly to the Ger. Reformed Churches from their protest at Spire in 1529. It ought to be observed, however, that the Lutherans were not alone in signing the protest, as many tns. of Germany and the Landgrave of Hesse, whose tenets were like those of the Zwinglians or Sacramentarians, also joined in it. The Swiss had no participation in the protest, which was a political act of the Ger. states.

Zwolle, cap. of prov. of Overijssel, Netherlands, on the Zwarte Water, 53 m. N.E. of Amsterdam. The Gothic St. Michael's Church (1406)

has a famous organ. The tn. is an important centre of transit trade, and has manufs. of iron and cotton, and shipyards. Near by is Agnetenberg Monastery, the home of Thomas à Kempis. Pop. (1928) 40,067.

Zygote, the cell formed by the fusion of a male gamete (or sexual cell) with a female gamete.

Zymotic (ζύμη, ferment), a term applied to diseases caused by certain micro-organisms. It was originally intended by Dr. Farr, the inventor of the term, to designate diseases promoted by processes analogous to fermentation. It is now applied to the chief acute infectious diseases: typhoid, cholera, small-pox, measles, scarlet fever, erysipelas, etc.

ADDENDA

Abercrombie, Lascelles, Eng. poet and critic, b. Jan. 9, 1881. Educated at Malvern and Victoria University, Manchester. Was lecturer in poetry at Liverpool University, 1919-22, and professor of Eng. literature at Leeds University, 1922-29. In 1929 he became Hildred Carlile professor of Eng. literature at London University, and from 1931 to 1932 was also lecturer in fine arts at Queen's University, Belfast. His first vol. of poems, *Interludes and Poems* (1908), is metaphysical and is concerned with the thought of the meaning of self. A.'s characteristic form is that of the dramatic poem. Perhaps his most notable achievement is *Emblems of Love* (1912). A. is also a writer on aesthetics and a critic of high standing. His poems were collected and pub. in *Oxford Poets* in 1930. His prose works include *Thomas Hardy* (study), 1912; *The Epic*, 1914; *Theory of Art*, 1922; *Principles of English Prosody*, 1923; *The Theory of Poetry*, 1924; *The Idea of Great Poetry*, 1925; *Romanticism*, 1926; *Progress in Literature*, 1929. Also edited *New English Poems*, 1931.

Acoustics, *Echoes*.—The difficulty from echoes arises only with large halls. It may become pronounced in the presence of smooth concave surfaces; hence it is important that such reflecting surfaces should be rendered absorbent and broken up so that the sound becomes weakened and dispersed. One way to bring about this result is to coffer the ceiling and walls and to render the coffers or sunk panels absorbent. As a complete determination of the three dimensions of the possible echoes and focusing effects in an auditorium presents a complicated problem, it is in most cases sufficient to study the sections, and there are three methods of studying the reflecting characteristics of sections: (1) the geometric method—i.e. the general direction of likely echoes is deduced from simple geometry based on the optical laws of reflection; (2) the sound-pulse method—i.e. experimentally by visual or photographic observation of the

progress of an actual sound-pulse within a model section having open sides. This test was first carried out in 1913 by W. C. Sabine, who applied, for the photographing of the sound-waves, the general technique developed by earlier physicists like Topler and Dvorak; (3) the ripple tank method—based on the fact that ripples in a small tank are suitable for illustrating acoustical phenomena, the wave-length being comparable with the size of any models concerned. Thus the necessity for imitating buildings of good design has disappeared with the modern practice of calculation from drawings, combined with tests on a model with the aid of ripple-tank and sound-camera. W. C. Sabine of Harvard University was the pioneer in quantitative reverberation experiments and associated theories, though Jaeger (1911) established the important preliminary points that the observed duration of reverberations was almost independent of the positions of the source and of the observer within the room; and that the effect of a given absorbent was practically independent of its position; and thus settled the relation between the reverberation period of a room and the absorbing power of its exposed surfaces.

A common method of locating echoes is by means of the 'echo-spotter.' This is a great improvement on all previous methods, including that of enclosing a metronome in a sound-proof structure with only one opening and directing the sound into the opening by means of a horn. The 'echo-spotter' is a device for projecting a parallel pencil of sound waves of high frequency. A beam of light from a lamp is projected along the axis of the sound beam so that the reflecting surface at which the sound wave is incident is illuminated. The projector consists of a parabolic reflector of smooth metal about 18 in. in diameter and a focus of 2 in. A high-tension spark gap is placed at the focus, and the electrodes are separated about $\frac{1}{2}$ in. An induction coil is made to supply either a continuous

stream of sparks which emit a series of high-pitched noises, or a single spark can be made which gives a sharp sound of very short duration. The latter is useful for the determination of repeated echoes or twitters. The projector is placed in various positions on the stage and the observer listens in the body of the auditorium. If the sound seems to the ear to be coming from the illuminated surface, that is the only surface producing the echo. If, however, the sound seems to be coming from a surface other than the illuminated surface, then a double or, perhaps, triple reflection takes place before the sound reaches the ear. The echo-spotter is not used for hall acoustic determination where it is possible to obtain accurate drawings of the auditorium. When, however, these dimensions are not available, the echo-spotter is useful. Consult W. C. Sabine, *Collected Papers on Acoustics*, 1922; A. H. Davis and G. W. C. Kaye, *The Acoustics of Buildings*, 1927.

Aga Khan, Aga Sultan, Sir Mahomed Shah (b. 1875). Head of Ismaili Mohammedans. Rendered loyal services to Great Britain during the Great War, and was granted rank and status of first-class chief. Has religious followers in E. Africa as well as in India and Central Asia. He was a prominent member of the India Conference, 1931. Well known also for his horse-racing activities. Pub. *India in Transition*, 1918.

Aiken, Conrad Potter, American poet and critic, b. at Savannah, Georgia, Aug. 5, 1889, son of William Ford A., educated at Middlesex School, Concord, and Harvard. Contributing editor of the *Dial*, 1917-19. His poems include *Earth Triumphant*, 1914; *Turns and Movies*, 1916; *Nocturne of Remembered Spring*, 1917; *The Charnel Rose*, 1918; *The House of Dust*, 1920; *Punch, the Immortal Liar*, 1921; *Priapus and the Pool*, 1922; *The Pilgrimage of Festus*, 1923, and *John Deth*, 1930. His prose includes an edition of *Modern American Poets*, 1922; *Notes on Contemporary Poetry*, 1919, and *Blue Voyage* (a novel), 1927.

Alice Springs, a telegraph station in N. Territory, Australia, in 23° 38' S. lat., 133° 37' E. long. It is the present terminus of the Port Augusta-Alice Springs railway (598 m.), a railway controlled by the Commonwealth Gov. This railway therefore reaches a distance of 1024 m. N. of Adelaide, and at the Katherine R. is 196 m. S. of Palmerston.

Anak. The ancestor of the Anakim (giants) (Deuteronomy ii.). Etymologically a common noun, 'necklace' (Song of Solomon, iv.), or perhaps

'neck' (Arabic, 'ung, neck, 'anaqa, to embrace). If this be the correct derivation, the name *bene 'Anaq* meant literally 'sons of the neck' or 'giants.' The Anakim are also called descendants of Arba (as in Joshua, xv., xxi.). They inhabited Hebron (called Kiriath-Arba). The three leaders of the *Bene 'Anaq*, Sheshai, Ahiman, and Talmi, were driven out of Caleb (Joshua xv.), and after this disappear from history. A. is often used in literature as synonymous with giant, e.g. Byron styles John Murray the 'Anak of Publishers.'

Anderson, Sherwood, American author, b. at Camden, Ohio, Sept. 13, 1876; education was scanty. His first novel, *Windy McPherson's Son*, was pub. 1916. With great psychological penetration he portrays life in the Middle West. Novels and short stories include *Marching Men* (1917); *Winesburg, Ohio* (1919); *Poor White* (1920); *Many Marriages* (1922); *Horses and Men* (1923); *Dark Laughter* (1925); also verse, *Mid-American Chants* (1918); and, mainly autobiographical, *Tar—A Mid-West Childhood*, *Sherwood Anderson's Notebook*, and *A New Testament*.

Angell, Sir Norman, Eng. author and journalist, b. Dec. 26, 1874. Educated privately and in France. His early years were spent in the U.S.A., ranching and later in journalism. In 1898 he came back to Europe, acting as correspondent to various American newspapers. In 1903 he joined the staff of the Paris *Eclair* and from 1905 to 1914 was General Manager of the Paris *Daily Mail*. As a student of European politics he was one of the few clear-sighted men who accurately gauged the disastrous economic and political consequence of a European war to both victor and vanquished. His best-known work in this connection is *The Great Illusion* (1910), translations of which have appeared in most European languages and in India. Other books are *The Foundations of International Policy*, 1914; *The Political Conditions of Allied Success*, 1918; *The Fruits of Victory*, 1921; *Foreign Policy and Our Daily Bread*, 1915; *Must Britain Travel the Moscow Road*, 1926; *The Public Mind: its Disorders, its Exploitation*, 1926; *The Story of Money*, 1930; *Can Governments Cure Unemployment?* 1931; *The Unseen Assassins*, 1932. A. is also the inventor of *The Money Game*, 1928, a card game which aims at demonstrating visually the fundamental economic laws. M.P. (Lab.) for N. Bradford (1929-30). Knighted, 1931.

Argentine Republic.—History since 1914:—The *de facto* gov., established

after the revolution of 1930, was succeeded by a constitutional régime in Feb. 1932, when General Justo was installed as President in succession to General Uriburn. The charges against ex-President Irigoyen were dropped and he was released on Feb. 19, 1932.

Athlone, Alexander Augustus F. W. A. G. C., first Earl of (b. 1874), British administrator, b. Kensington Palace, April 14, third son of late Duke of Teck and late Princess Mary Adelaide. After passing out of Sandhurst, he was commissioned to the Hussars, in the Royal Horse Guards, and the 2nd Life Guards, and served with distinction in Matabeleland in 1896 and in the S. African War, 1898-1900. Governor-General of the Union of S. Africa from 1925 till 1931. Installed as Chancellor of London University, Feb. 18, 1932.

Atlantic Flights. In April 1928 three airmen, Von Huchefeld, Koehl (Ger.), and Fitzmaurice (Irish), crossed in the *Bremen*—a monoplane of the Junker type. The flight was from Ireland to Greenly Island, Labrador (2200 m.) and took about 36 hrs. In June 1930 Wing-Commander Kingsford Smith crossed from Portmarnock, Dublin, to Newfoundland. On July 31, 1930, the British airship, R 100, set out on its Atlantic flight, arriving at Montreal at 5.33 a.m. on Aug. 1, seventy-nine hours after leaving Cardington. The return journey was completed in fifty-seven hours on Aug. 16. On Dec. 17, 1930, twelve Italian flying-boats, under Gen. Balbo (q.v.), started from Orbetello, all but four reaching Brazil, on Jan. 6, 1931, after landing at various islands in the Atlantic. The Ger. flying-boat Do.X with thirteen passengers left Lisbon on Jan. 31, 1931, and reached Brazil on June 5, after landing at Las Palmas, Cape Verde Is., and Fernando Naronha. The Ger. airship *Graf Zeppelin* also made Atlantic crossings in 1928 and 1931 (see further under **AERONAUTICS**).

Aurora Borealis, see **LIGHTS, NORTHERN**.

Bacon, Sir Reginald Hugh Spencer (b. 1863), British admiral; educated, H.M.S. *Briannia*. In 1897 appointed commander of H.M.S. *Theseus*. Started the submarine boat service in the Royal Navy, and was Naval Assistant to the First Sea Lord of the Admiralty in 1905. Capt. of H.M.S. *Dreadnought* during the first commission: Director of Naval Ordnances and Torpedoes, 1907-09. Retired 1909 and became managing director of the Coventry Ordnance Works. When the Great War began he commanded the Heavy Howitzer

Brigade, Royal Marine Artillery, with the B.E.F. (q.v.) in France. Rendered great service in command of the Dover Patrol (q.v.) from 1915 to 1918. K.C.V.O., 1916. Pub.: *Benin, the City of Blood* (he was chief of intelligence service in the Benin Expedition of 1897); *The Dover Patrol*, 1919; *The Jutland Scandal*, 1925; *A Naval Scrap Book*, 1925; *The Life of Lord Fisher of Kilverstone*, 1929.

Barclay's Bank, one of the big five banks or banking amalgamations of Great Britain. The nucleus of the present bank dates back to the eighteenth century, the founder of the London business being John Freame, a goldsmith, whose son and successor, Joseph, took James Barclay, a brother-in-law, into partnership, since when the Barclay family have always had a member in the business. B. B. was registered in 1896 as Barclay and Company, Ltd., to acquire the banking businesses of Barclay, Bevan, Tritton, Bouverie and Company, and Ransom of London, and of Gurney and Company of Norwich, some of which banks were founded in the seventeenth century. Other concerns, such as United Counties Bank and the London and Provincial and South Western Bank, were absorbed during the Great War, and altogether over forty banks have been merged in the amalgamation, the name being changed to the present style in 1917. B. B. also controls Barclay's Bank (Dominion, Colonial and Overseas), which latter was incorporated in 1836 as the Colonial Bank and re-incorporated in 1925 under its present name. In 1896 the paid-up capital was £2,000,000 and the reserve £1,000,000, with deposits amounting to over £26,000,000. To-day the authorised capital is £20,000,000, the issued capital £15,858,217, and the unissued £567,411, with deposits of over £300,000,000. The net profit for 1931 was £1,794,825, a sum of £565,950 being carried forward. The bank does a large business in overseas investments. The authorised capital of Barclay's Bank (Dominion, Colonial and Overseas) is £10,000,000 and the issued capital nearly £7,000,000.

Barker, Ernest, Eng. historian and classical scholar, b. Sept. 23, 1874. Educated at Manchester Grammar School and Balliol College, Oxford. In 1908 he was elected fellow of Merton College; in 1909, fellow and lecturer of St. John's College; in 1913, fellow and lecturer of New College. In 1920 he went as Principal to King's College, London, remaining there until 1927, when he became professor of political science at Cambridge, also being elected fellow of Peterhouse. Books include *Poli-*

tical Thought in England from Herbert Spencer to To-day, 1915; *Greek Political Theory*, 1918; *The Crusades*, 1923; *National Character and the Factors in its Formation*, 1927; *Church, State, and Study: Essays*, 1930; *Burke and Bristol*, 1931. He is also the Editor of Dent's Library of Greek Thought

Baroja, Pio, b. 1873, in San Sebastian, and therefore a Basque, is one of the greatest of the modern Spanish novelists. Coming from poor people, he worked as a baker's boy, and then studied medicine, but soon devoted himself to literature. In one aspect he is in the line of the great Spanish writers of picaresque novels, notably in the trilogy of *La Lucha por la Vida*, 1904. In most of his books he deals with the outcasts of life, those who are poor and hungry and ragged. He has written a group of novels under the generic title of *Memorias de un hombre de accion*, which are based upon the deeds of an historic personage.

Barth, Karl (b. 1886), Ger. theologian. The leader and prophet of the New Reformation thought. B. has changed the whole outlook of Protestant theology on the Continent, where the reformed churches have acclaimed his message as an inspiration to renewed vigour. In the Ger. youth movement his chief work up to the present is *The Word of God and the Word of Man* (translated by D. Horton, 1930). In this we learn that B., disillusioned alike of redemptive influence of socialism and of the ineffectiveness of evolutionary progress, and indeed of all human effort, abjures all religious systems which take man as their centre; or, in other words, the only hope for religion is that man should get back to God. In the language of theology, B. opposes to the familiar anthropocentric theology one that is theocentric, and against the immanence of God he sets his transcendence. Consult R. D. Hoyle's *The Teaching of Karl Barth*, 1930.

Bartok, Béla (b. 1881), Hungarian composer and pianist, b. at Nagyszénmiklos, Rumania (formerly in Hungary), March 25. Studied piano and harmony under L. Erkel, son of Franz Erkel, the opera-composer; composition under Koessler, and piano under Stephan Thomán. By 1904 he had produced several works, including songs, piano pieces and a suite for orchestra, all of which showed individuality and, besides the influence of Strauss, a true Hungarian colouring. These early themes bear the obvious impress of Hungarian popular melodies, and his symphonic poem *Kossuth*

(1903) indicates the influence on B. of a strong contemporary national movement. This basis, however, was less suited to a national style in music than the much older peasant music and folk-songs, and B., who had been teacher at the Budapest High School since 1907, set out to search for old traditional melodies. His style soon showed the effect of this archaic music, which is mostly modal and rhythmic. Of this period are his *Deux Images* (1910), *Nenies* (1910), and the opera *Duke Bluebeard's Castle*. Discouraged, he withdrew from public life to devote himself to folk-lore studies and travel, returning with a large collection of Arab peasant music. Now his work became more individual and subjective, and there was a change in popular favour. His pantomime, *The Wooden Prince* (1917), brought him recognition. Since this date he has been exploiting a new and rather perplexing expressionist style, e.g. the piano-sonata (1927), the second violin sonata, and the second string quartet. Also published *Hungarian Folk Music* (Eng. trans. by M. D. Calvocoressi, 1931).

Bell, Clive (b. 1881), art and literary critic; educated at Marlborough and Cambridge. Has made a special study of French painting, his *Since Cézanne*, 1922, and *Landmarks in Nineteenth-century Painting*, 1927, being notable contributions to the comparative study of Fr. and other schools of painting. In art B. is a stickler for pure æsthetic enjoyment, or, in other words, for the picture in itself and even apart from what it represents. Other works: *Art*, 1914; *Pot Boilers*, 1918; *Poems*, 1921; *Proust*, 1928; *Civilisation*, 1928; *An Account of French Painting*, 1931.

Beveridge, William Henry, Director of London School of Economics and Political Science since 1919, b. Rangpur, Bengal, 1879. Educated: Charterhouse, Balliol College. First chairman of Employment Exchanges Committee; in Board of Trade, 1908-16, as Director of Labour Exchanges, 1909-16, and Assistant Secretary in charge of Employment Department. Assistant General Secretary to Ministry of Munitions, 1915-16. In Ministry of Food as Second Secretary, 1916-18; and Permanent Secretary, 1919. Senator of London University since 1919, and Member of the University Court since 1929; Vice-Chancellor, 1926-28. Member of Royal Commission on Coal Industry, 1925. Publications include: *A Problem of Industry*, 1909; *The Public Service in War and Peace*, 1920; *Insurance for All*, 1924; *British Food Control*, 1920.

Blackett, Sir Basil Phillott (b. 1882), Eng. financial expert, b. Jan. 8; educated at Marlborough and Oxford. He was secretary of Indian Finance and Currency Commission, 1913-14, and on the outbreak of the Great War went on a special mission to the U.S.A. to discuss exchange problems arising out of the War. In 1915 he was a member of Anglo-Fr. War Financial Mission to U.S.A. which raised the Anglo-Fr. War Loan of five hundred million dollars. Then became member of National War Savings Committee; representative of the British Treasury in U.S.A., 1917-18; and from 1922 to 1928 was finance member of the executive council of the Governor-General of India. Is now a governor of the Bank of England, chairman of Imperial and International Communications Company and of the Colonial Development Advisory Committee, and a director of Cables and Wireless, Ltd., and other influential bodies.

Boult, Adrian Cedric (b. 1889), Eng. conductor, b. at Chester, April 8. Educated at Westminster School and Oxford University, where he studied music under Sir Hugh Allen; later, studied music at Leipzig under Hans Sitt, Eugen Lindner, and devoted attention to the methods of Nikisch. Was on the music staff, Royal Opera House, Covent Garden, 1914, and from 1918 conducted at R. Philharmonic Society, Liverpool Philharmonic Society, London Symphony Orchestra, and Queen's Hall Orchestra. Was on teaching staff at Royal College of Music, London, 1919. Conductor of Birmingham Festival Choral Society, 1924-30; and Music Director of the B.B.C. Orchestra, 1930. Has done fine work, especially for the younger Eng. school of composers. Published *Handbook for Conductors*.

Bradman, Donald George, Australian cricketer, b. Cootamundra, New South Wales, Aug. 27, 1908. Educated: Bowral Intermediate High School. He first played for Australia in 1928 against the M.C.C. team. At Sydney in 1929-30 he beat previous records by scoring 452 not out in 415 minutes against Queensland. In the second innings of his first match in England at Trent Bridge he made 131, following with 254 at Lord's, 334 at Leeds, and 232 at the Oval. The Leeds innings beat the record individual score in Test Matches between England and Australia which was held by R. E. Foster since 1903-04 with 287 at Sydney.

Braque, Georges (b. 1881), Fr. painter. His father was a contractor for house-painting, and B. in his boyhood observed his father's workmen mixing colours and es-

pecially noted the processes of 'grain-ing' and 'marbling.' He was the leader of the Cubists, a name which evidently dates from 1908, one of his canvases in the Salon des Indépendants directly suggesting the description. Picasso (q.v.) is commonly credited with having invented Cubism, but B. probably preceded him with crystallisation, the crystal theory undoubtedly suggesting Cubism. B. aimed at producing 'a new sort of unity, a lyricism which issues wholly from the means employed.' One of the best examples of his art is 'Still Life' (1912), which illustrates the idea of shuffling arbitrarily selected fragments of an object seen from different points of view. See Frank Rutter, *Evolution in Modern Art*, 1925.

Breul, Karl Hermann (1860-1932), Ger. philologist and educationist, b. in Hanover, Aug. 10, and educated at Goethe Gymnasium, where he first studied theology, but then took up modern languages at Tübingen, where he studied under Ten Brink and Boehmer. Settled in England in 1884 and was appointed first university lecturer in German by Cambridge University, which had just estab. the mediæval and modern languages tripos. In 1902 he was appointed a professor of German by London Univ., but did not take up the appointment. In 1910 he was elected to the recently founded Schröder professorship of German at Cambridge University. Had a strong influence on education in his adopted country. He made it his life's task to develop in England the higher study of German and Germanic literature and philology, to reform the teaching of modern languages at schools and, generally, to strengthen the literary relations of England and Germany. President of Modern Language Assoc. 1910, and of the English Goethe Soc. (founded 1886), and one of the founders and first editor of the *Modern Languages Quarterly* (1897). Made numerous contributions to the literature on the teaching of modern languages: *The Teaching of Modern Languages in our Secondary Schools*, 1898, repub. as *The Teaching of Modern Foreign Languages and Training of Teachers*; *Handy Bibliographical Guide to the Study of the German Language and Literature*; also produced well-annotated edns. of Ger. classics and an edn. of *Weir's Ger. Dict.* Edited Eng. and Fr. texts, including a fine edition of the *Cambridge Songs*—a notable contribution to the study of mediæval literature. Died April 13.

British East Africa. The Report of the Joint Select Committee on

Closer Union (referred to at the end of the article *BRITISH EAST AFRICA*, Vol. 3, page 15) was issued in Nov. 1931. It rejects the proposals for making a single administrative unit out of the three countries—Kenya, Uganda, and Tanganyika Territory—and accepts the demonstrated fact that in all three closer union is more feared than desired. The witnesses called showed that there existed no sufficient measure of local support for the creation of a High Commissioner and a Council drawn from the three territories. The Committee therefore decided in favour of leaving the territories to develop along their own lines, co-operating as far as they could by means of the periodical conference of governors and through the permanent secretariat of that conference, and also to help this co-operation by the appointment of an Adviser on Transport.

Burckhardt, Jakob (1818–1897), Swiss writer on social history and art critic, especially famous for his works on the Italian Renaissance. Educated at Berlin and Bonn, and was a pupil of Franz Kugler, the art historian. He was professor of history at Basel University for nearly fifty years, and devoted his life to teaching and the study of the Renaissance, making a most marked impression as a philosopher of history. His masterpiece is his *Kultur der Renaissance in Italien* (1860), a most brilliant survey of the period, in spite of defects arising from the inherent difficulties opposed to all historians of this epoch. It was the compilation of his *Cicerone* or art guide to painting in Italy, first pub. in 1855, that led to his further study of the Renaissance and to the writing of the *Die Kultur* and also of his *Geschichte der Renaissance in Italien* (1867). This latter work shows piercing historical insight, but requires to be supplemented by a work like Sismondi's *Histoire des Républiques Italiennes* for details of the history of the various Italian states. B. purports to prove that the moral and political salvation of the papacy was due to its mortal enemies; that but for the Reformation, which compelled the popes to put their house in order, their own degradation would have brought the whole ecclesiastical state to an end; and that the enslavement of Italy by the Spaniards saved that country from the Turks and from barbarism. Works: *Die Zeit Konstantins des Grossen*, 1853 (4th edn., 1924); *Der Cicerone: eine Anleitung zum Genuss der Kunstwerke Italiens*, 1855, translated into Eng. by Mrs. A. H. Clough in 1873 and reprinted in 3 vols. in

1925; *Die Kultur der Renaissance*, 1860 (14th ed. 1925), translated into Eng. in 1878 and again in 1929 by S. G. C. Middlemore; *Geschichte der Renaissance*, 1867 (7th ed. 1924); *Griechische Kultur-geschichte*, 1898–1902 (pub. posthumously). Consult Joel, *Jakob Burckhardt als Geschichts-philosoph*, 1918; W. Rehm, *Jakob Burckhardt*, 1930.

Campion, Thomas (c. 1575–1619), Eng. poet and musician, b. at Witham, Essex, and educated at Cambridge and on the Continent, studied law at Gray's Inn, but discarding it, practised medicine in London. He wrote masques, and many fine lyrics remarkable for their metrical beauty, of which *Cherry Ripe* and *Lesbia* are well known. His four *Books of Airs* were published between 1601 and 1613. He also wrote *Epigrams* in Latin, and *Observations on the Arte of Poesie*, 1602. He composed the music for most of his songs.

Cantor, Georg (1845–1918), Ger. mathematician, b. at St. Petersburg (Leningrad), March 3, and educated at Berlin and Göttingen. Professor of mathematics at the University of Halle. C. created a new field of mathematical investigation and in the application of his deductions to analysis, and in some measure also to geometry, he furnished a powerful instrument for dealing with the foundations of mathematics and for stating the inevitable limitations to which so many mathematical results are liable. In 1870 he solved the question of the uniqueness of the representation of a function by Fourier's series. His chief work is the *Contributions to the Finding of the Theory of Transfinite Numbers* (pub. in London and Chicago in 1915), in which he developed the theory of sets of points. For his research in pure mathematics he was awarded the Sylvester Medal in 1904. Died at Halle, Jan. 6.

Cape Flights. The record of Glen Kidston (q.v.) for the England-Capetown flight was beaten in Nov. 1931, by Mr. Store and Miss P. Salaman, whose time was 5 days, 8 hours, 37 minutes. The record is now held by James Allen Mollison (a native of Lanark and a flying instructor at Adelaide, South Australia), who also holds the Australia to England record (9 days). His time for the Cape flight was 4 days, 17½ hours. He started from Lympe at 1.5 a.m., March 24, 1932, and reached Menerton Beach, Capetown, at 8.35 p.m. on March 28, his machine being a Puss-Moth.

Cardoza, Benjamin Nathan, b. New York City, May 24, 1870, graduated from Columbia University and ad-

mitted to the Bar in 1891. He became a justice of the Supreme Court of New York State, 1914-28. He was elected Chief Justice of the Court of Appeals of New York State in 1927. When, in 1932, Justice O. W. Holmes resigned from the U.S. Supreme Court, C. was recommended to succeed him by the leading Bar associations of his own state, as well as all over the country. It was generally recognised that he had one of the greatest legal minds in the country. President Hoover, thereupon, nominated him for Associate Justice of the U.S. Supreme Court, and he was confirmed by the U.S. Senate in one minute. He and Justice Brandeis are both Jews, making two of that faith out of the nine justices comprising the country's highest court. Justice Cardozo's two best books are *The Nature of the Judicial Process*, 1921, and *The Growth of the Law*, 1924. Both have become standard works for students of the law.

Cézanne, Paul (1839-1906), Fr. painter and founder of the Post-Impressionist school, b. at Aix, Provence, Jan. 19, son of a banker. At first destined for a banking career, but early forsook his father's business house to study at the art school in Paris. Was influenced to some extent by the adherents of Manet, but was more revolutionary than others of that group. He seems to have taken part in the Commune while in Paris, but thereafter returned to Aix, where he spent the remainder of an uneventful life painting landscape studies and portrait studies. He was a contemporary of the Impressionists, and used their colour palette with the addition of brown, a colour peculiar to the sun-scorched S. of France. When C. left Paris and returned to Aix, he set himself the task, as he said, 'to make of Impressionism something solid and enduring like the art of the Old Masters.' His early rather flashy style of painting gave way to a method of absolute sincerity. No brush-stroke was placed upon the canvas that was not realised, and it is this honesty of purpose rather than a facility in drawing that has made C. an acknowledged world-master. He analysed the decomposition of light and the division of tones with remarkable intensity. His 'Dahlias' and his 'House of the Hanged Man' established him as a great painter of still life, as also the 'Card Players,' which is notable for apparent defects of drawing which have been imitated by followers who did not understand the principles of his workmanship; for with faults or apparent faults in

drawing went also subtlety and skill in developing form through colour. Contrasted with Manet and Monet, C. did not see things in masses of smooth colour or bathed in colour-light, but rather 'as giving back colours which had their own given qualities and values, due to their own wave vibrations, just as notes in music have their own sound vibrations'; and indeed he spent a long life in trying to grasp and fix the laws of the vibrations of colour, and in this work he strongly influenced the later generation, particularly Van Gogh and Gauguin. See E. Bernard, *Souvenirs sur Paul Cézanne*, 1924; A. Vollard, *Paul Cézanne, his Life and Art* (Eng. trans.), 1924; E. Faure, *Paul Cézanne*, 1926; Roger Fry, *Cézanne*, 1927; J. Meier-Graefe, *Cézanne*, 1927; J. Gasquet, *Cézanne: what he said to me*, 1931.

Civet, or Viverra, an old-world genus of cat-like carnivores, typical of the family Viverridae. The genus contains the largest species in its family, and, like most of its allies, has a scent gland near the sexual organs from which the perfume C. is obtained. The animals are long and thin of body, and have long heads with sharp muzzles and short ears; the legs are short, the feet are small and hairy. In habit, the Cs. are terrestrial, and they feed chiefly on birds and reptiles. The penetrating odour of the C. makes it of value as a perfume, and the animals are often kept in captivity in order that it may readily be extracted from them. *V. civetta*, the only African species, yields the best-known C. perfume of commerce; *V. zibetha* is the widely-distributed Indian C.

Cole, George Douglas Howard (b. 1884), Eng. writer on economics, b. Sept. 25, and educated at St. Paul's School and Oxford University. Is University Reader in Economics at Oxford, and has become a leading authority on labour questions and economics in relation to industry. Vice-president of Workers' Educational Association and a member of the Economic Advisory Council. Publications include *Self-Government in Industry*, 1917; *The Payment of Wages*, 1918; *Chaos and Order in Industry*, 1920; *Workshop Organisation*, 1923; *Labour in the Coal-Mining Industry*, 1923; *Organised Labour*, 1924; *A Short History of the British Working-Class Movement*, 1925-27; *The Next Ten Years in British Social and Economic Policy*, 1929; *Gold, Credit and Unemployment*, 1930. Cortot, Alfred (b. 1877), Fr. pianist, b. at Nyon, Switzerland, of Fr. parentage. Studied at Paris Con-

servatoire, first under Decombes (a former pupil of Chopin) and then under Diémer, winning a première prize in 1895. Soon made a name as an interpreter of Beethoven's concertos, and was appointed assistant conductor at Bayreuth. In 1902 he founded a concert society in Paris, to which he gave his name. As conductor, he gave first performances in Paris of *Götterdämmerung*, *Parsifal*, *Tristan*, etc. In 1905 he founded (with Jacques Thibaud and Pablo Casals) a trio which later became the best in the world, and at the age of thirty was head of the highest pianoforte course at the Paris Conservatoire. His tone gives an effect of inexpressible transparency, without losing its vigour; and he is without an equal in his interpretation of the works of César Franck, Debussy and Gabriel Faure.

Craig, Edward Gordon, theatrical designer and actor, b. near London, Jan. 16, 1872; son of Ellen Terry (q.v.) and Edward William Godwin, architect and archaeologist (1833-86). Educated at Bradfield College and Heidelberg University, on leaving which in 1889 he adopted the name of Edward Gordon C., legalised by deed-poll Jan. 24, 1893. He made his debut under Sir Henry Irving at the Lyceum as Arthur St. Valery in the *Dead Heart* and in the ensuing ten years took part in various plays of Shakespeare and in *Ravenswood*, *The Lyons Mail*, *School for Scandal*, etc., his best rôles being Blondello, Cassio, Petruchio and Charles Surface. In 1893 he began the study of drawing and wood engraving, and soon developed a remarkable flair for artistic stage and costume production. His powers in this direction were first shown in the production of Purcell's *Dido and Aeneas* in 1900, and soon after this in *Bethlehem*, *Sword and Song*, the *Vikings*—in which he made artistic innovations in scenery and costume, lighting and stage management—and in 1905 he prepared designs for Eleonora Duse for the production of *Elektra*. Memorable productions by him have been those of *Hamlet*, at the Moscow Art Theatre in 1912, and of Ibsen's *The Pretenders*, at the State Theatre, Copenhagen, in 1926. The designs used in the latter were published in 1930, entitled *A Production*. C. has also illustrated an edition of *Hamlet*, pub. by the Cranach Press, Weimar, in 1930. In 1913 he founded a school for the art of the theatre at Florence. C. is also celebrated as a wood-engraver, an art which he began to practise in 1893 at the instance of William Nicholson, the artist. Some of his woodcuts are reproduced in

Woodcuts and some Words (1924), and many originals are in the Victoria and Albert Museum. Books by C. include: *The Art of the Theatre*, 1905; *On the Art of the Theatre*, 1911; *Towards a New Theatre*, 1913 (contains plates of designs for Shakespeare, Ibsen and other dramatists); *The Theatre Advancing*, 1921; *Scene*, 1923; *Books and Theatres*, 1925; *Henry Irving*, 1930; *Ellen Terry*, 1931. See E. Rose, *Gordon Craig and the Theatre*, 1931.

Cyprus. A serious revolt broke out in Oct. 1931. Rioting began in Nicosia with the destruction of Government House by the mob, ostensibly as a demonstration in favour of union with Greece. The rebellion was, in fact, the culmination of a long campaign of legislative obstruction and open sedition, carried on by a small section of Greek Cypriot leaders, including various clerics and members of the Legislative Council. The peasants allowed themselves to be led away by these extremists into pillage and arson. The burning of Government House destroyed the governor's (Sir Ronald Storrs) collection of Oriental antiquities—a peculiarly unmerited attack in view of the services of this governor in accelerating the general progress of the island. Reinforcements reached the island from Malta and Egypt and the revolt was quelled. The leaders, including the Bishops of Kitium and Kyrenia, were deported. The former constitution has now been modified to suit the changed conditions. Under this constitution, which dates from 1925, a Legislative Assembly was created, whose responsibility it was to advise the British gov. on all subjects; but this Assembly, far from being a focus of union in the island, came to be a centre of Cypriot-Gk. unrest and intrigue. The Gk. members represented the majority in the island and protested that their Gk. origin was offended by British control, and that, while they admitted that the interests of C. were best served as a colony of some great Power, that Power ought to be Greece; and this general ideal of union with Mother Hellas, or 'Enosis,' became a general grievance which was accentuated by taxation and by a recent alteration in the system devised for the education of the youth of C. But as to taxation, it was forgotten by the agitators that the British administration, in collecting some 20 per cent. of the value of the produce, spent most of it on the service of the colony, whereas, under the old Turkish regime (see CYPRUS, Vol. IV.), enormous taxes were

eval E. A. finds expression chiefly in Gothic architecture, and in sculpture as applied to ecclesiastical buildings. The Fr. Gothic style spread throughout Europe through the monasteries, and it was but natural that the variety of historical conditions and ideals, no less than of climate and materials in the different countries into which the style spread, should lead to the formation of a new national style in each, though all manifest a common origin. Just as the pointed arch, so often applied in Gothic art, appears for the first time in France, though derived by France through the Arabs from Persian art, so the ogival vault, a fundamental principle of Gothic art, appears for the first time in England, whencesoever ultimately originated. Durham Cathedral presents the oldest example of it. In developing a national style, Eng. Gothic reveals a definite kinship with the ant. Norman buildings, notably in the massive, fortress-like structure, erect, flat-topped tower, and choir enclosed by a square roof. Early Eng. Gothic pillars are somewhat distinctive in that they consist of a central cylindrical pillar surrounded by other pillars detached from it from capital to base, and numerous blind pointed arches along the walls, designed to alleviate the mass of the edifice. The typical roof ceiling is in wood resting on corbels, while the turrets are crowned with battlements. In the decorative sphere, the changes introduced by E. A. were the immense window in the choir, the ornamentation of the vaults with star ribs—as, *e.g.*, in York Minster, Lichfield, Exeter and Hereford Cathedrals—and flamboyant decoration generally. During the fifteenth century Eng. Gothic art abandoned the flamboyant or fantastic for a simpler and more restrained style of decoration as exemplified in the Tudor depressed arch; while the inner roof was generally of painted wood with stone-like stalactites pendent from the ribs. Early Eng. sculpture is noteworthy for the fancy which informs its realism. The exterior of the Eng. cathedrals show little of this humorous fancy, but in the interior remarkable portrait-statues are to be found between arches, below the windows of the apse, on the wall plinths, and, above all, on the tombs. Examples are to be seen in Westminster Abbey and in the cathedrals of Lincoln, Canterbury, Salisbury and Worcester.

Modern English Painting.—E. A. shows its most distinctive traits in painting, and particularly in the nature painters; but equally brilliant if more conventional work is found in portraiture. E. A. owes a great

debt to the realism and sincerity of Hogarth (1697–1764), who, in spite of the revolting nature of much of his subject matter, strongly influenced the development of indigenous art at a time when it had sunk to shallowness and artificiality. His axiom that the only school was that of nature needs no emphasis to-day. Yet, though it was scarcely recognised in his time, it was destined to become the very keynote of E.A., and indeed of British art generally, and the measure of the debt to his work is to be gauged accordingly. Other and much greater painters were soon to follow, but Hogarth's part in the history of E.A. has been aptly compared to that of Dryden or Pope in the history of Eng. literature; in other words, he gave it an impetus in the right direction without which its independent national development would have been delayed. Gainsborough (1727–88) is regarded as the 'father of modern Eng. painting,' and his influence is discernible even in the work of the still greater artist Constable (1776–1837), and in that of Richard Wilson (1713–82) and the mid-Victorian landscape painters David Cox (1793–1859), John Linnell (1792–1882), Samuel Palmer (1805–81), James Clark Hook (1819–1907), George Heming Mason (1818–72), and Edward Stott, who painted poetic aspects of life in the fields, and who with Gainsborough, Constable and Turner (1775–1851) stand at the beginning of modern art in England. The influence of Constable as a nature painter was profound, and made itself felt on the Continent, especially in France, where he may be said to have been the true inspiration of the Barbizon school led by Millet and Corot. Coeval with Gainsborough. Reynolds (1723–92), in brilliant and versatile portrait painting, is less enduring; for his versatility expressed itself in what has been termed academicalism as opposed to the individuality of Gainsborough and Constable. All through the Victorian period of E.A. both academicalism and classicism have vied with nature in popular favour, and it would be difficult to say whether the realism of Constable is, in the last resort, more highly favoured than the romanticism of Leighton, the idealism of Turner, or the pseudo-classicism of Lord Leighton (1830–96). But certainly the nature painters have endowed E. A. with a more permanent impression than have the great portrait painters, whose classicism has not been followed by the present-day portrait painters. Constable was the first painter to see that nature wholly ignores our conventions of

beauty and propriety—a negative principle which lies at the root of all naturalistic art to-day. His stormy skies and leaves glittering in sunlight reveal the innovator in light effects. In fact, even since the development of the pre-Raphaelite school, the marvellous verisimilitude in definiteness of details persists in Eng. nature painters, *e.g.* in the work of Millais, Benjamin Williams, Leader (1831–1923), and John Brett (1831–1902). Turner, who doubtless gained much from others, yet stands alone as the greatest figure in E. A. His exemplar was Claude Lorraine, but he surpassed the Fr. artist in atmosphere and in breadth of conception, however inferior he was in the mastery of technique and the qualities of form. Among nature painters Turner is unique, conveying through a novel and marvellous use of colour his individual vision of light; and in him E. A. has affinities with Rembrandt before him and with Monet after, and, for that very reason, standing so far apart and above his contemporaries and successors as not to be typically Eng. Mention may also be made here of Richard Parkes Bonington (1801–28), a painter of great promise whose style savours of Fr. ideals. Of the same period as Constable and Turner was John Crome (1768–1821), the founder of the Norwich School, whose dominant characteristic is sincerity and freshness of outlook. If E. A. owes less to him in the new naturalistic and impressionist interpretation of familiar nature than to Constable and Turner, there are beauty and meaning in his work, and more of poetic quality in it than in his master, Hobbema, whose traditions he carried on, however unconsciously, in England. Associated with Crome are the younger Crome, John Cotman (1782–1842), James Stark (1794–1859), George Vincent (1796–1836), and Robert Ladbrooke (1768–1842). Of these, Cotman is especially noteworthy for his influence in the development of the art of water-colour painting in England, his work in this medium being followed up by that of a group of Eng. artists, including John Robert Cozens (*d.* 1786), Thomas Girtin (1775–1802), Copley Fielding —in marine studies—and Samuel Prout —in architectural work— famous as ‘the Eng. School’ and attaining a world importance in the work of Turner. In the work of Blake (1757–1827), the creator of strange visions of the ‘other world,’ we have an original vein in imaginative art, and so inimitable as to make him the great pictorial mystic of the world. Of the same

great period of E. A., striking an equally distinctive note, are Gillray (1757–1815) and Rowlandson (1756–1827), caricaturists of manners and customs, whose tradition was carried on by Cruikshank (1792–1878). In portrait painting Reynolds is the Eng. classic. Reynolds had a wide knowledge of Italian painting, and from the work of Cresspi and others he no doubt formulated his maxim that ‘it is not the eye, but the mind which the painter of genius desires to address.’ Hence he painted his sitters not in fashionable dresses, as being ‘too particular and individual,’ but in non-committal costume; thus his portrait of Mrs. Siddons is in some ways reminiscent of Michelangelo’s ‘Isaiah.’ Besides Reynolds, the great names in E. A. are those of Romney (1734–1802), John Hoppner (1758–1810), and Sir Thomas Lawrence (1769–1830), whose brilliant work marks an epoch in E. A. and the close of the artificial tradition. Other names of this period important in E. A. are those of William Etty (1787–1849), the romantic colourist, and William Collins (1787–1847), a typically Eng. landscape painter, who left their mark on the art of their country in the work of the members of the New English Art Club. Mention must also be made of John Opie (1761–1807), painter of portraits of famous contemporary statesmen; and Thomas Stothard (1755–1834), who in the illustration of the novels of Fielding, Richardson, Sterne and Smollett initiated a revolution in book illustration which was later to develop into one of the most striking art movements of the century.

Pre-Raphaelite Brotherhood.—A number of brilliant artists are grouped under this vague description which, as applied to art, connoted the spiritual treatment of themes as opposed to the conventionally artistic. Various writers add other names to the original brotherhood, which comprised Leighton, Watts, Rossetti, Millais, William Morris, and Burne-Jones. See PRE-RAPHAELITE BROTHERHOOD. Among those who came under the pre-Raphaelite influence, is Walter Crane (1846–1915), principally a water-colour painter, and well known as a designer and book illustrator. E. A. has also a notable group of animal painters, the chief being Sir Edwin Landseer (1802–73), James Ward (1769–1859), George Stubbs (1724–1826), George Heming Mason (1818–72), George Morland (1763–1804), John Frederick Herring (1795–1865), and Thomas Sidney Cooper (1803–1902). The Eng. animal painters are admittedly inferior to Continental

painters like Rosa Bonheur and Troyon because less true in feeling. But their merit lies in showing that nature painting and landscape painting were not synonymous. On the other hand, sentimental interest sometimes leads to emotional incongruity in the Eng. painters of animal life, and this fault is also to be found in other genres where over-much importance is attached to the art of the literary painter. The art of telling a story in illustration enhanced the popularity of Landseer, and certainly made the unreal love-scenes of Marcus Stone popular, as also the episodic themes of Luke Fildes and the work of such artists as Hacker, Solomon and others whose chief concern is the expression of reverie and meditation. (For present-day painters see under names of individuals.)

English Architecture.—The change from the Gothic period to the Renaissance began in England in the opening years of the sixteenth century, the transition being gradual from Perpendicular Gothic, through Tudor and Jacobean Renaissance styles, to the developed work of Inigo Jones and Wren. Even famous buildings, however, show the old in conflict with the new; e.g. Henry VII.'s Chapel in Westminster Abbey is the first building in Renaissance style, but its vaulting is essentially Eng. Hampton Court, the earliest large building in the new style, owes its decorative detail to Italian workmen, but the fabric to Eng. Half-timbered houses were greatly favoured in Eng. architecture, and the great number of those surviving were built in Elizabeth's reign. The houses of the nobility, however, were less Eng. in tradition, being built in a chaos of styles to suit the whim of the owner, and many owe their ornamentation to Flemings and Gers., e.g. Longleat, Knowle Hall, and Hatfield House—all of which are none the less fine buildings and picturesque. Renaissance architecture in England assumes definite shape with Inigo Jones, some of whose finest work is to be seen in the old Royal Palace of Whitehall, the Queen's House in Greenwich Hospital, and St. Paul's Church, Covent Garden. Wren carried on the work of Inigo Jones not only at Greenwich Hospital, but also at Hampton Court, adapting to Eng. taste and requirements the style introduced by Inigo Jones. Wren was also responsible for a large number of city churches, notably St. Stephen's, Walbrook, St. Bride's, Fleet Street, and Bow Church, Cheapside—all fine buildings, and giving a foretaste of his masterpiece,

St. Paul's Cathedral. Other names in Eng. architecture are John Vanbrugh (1664–1726), the architect of Blenheim Palace and Castle Howard; William Kent (1684–1748), famous for the Horse Guards, Whitehall; James Gibbs (1682–1754), architect of St. Martin-in-the-Fields and St. Mary-le-Strand; George Dance (1698–1768), the builder of the Mansion House; and George Dance the younger, who built the old Newgate Prison. The old classic style of architecture was disappearing in George III.'s reign when Somerset House was built by Sir William Chambers (1726–96). It is almost the last building of importance before the period of decadence. See further under ARCHITECTURE.

English Sculpture after the Renaissance.—The Gothic style in England was stiff and conventional, but under the influence of such Italians as Torrigiano developed naturalness, as instanced by the tomb of Henry VII. in Westminster Abbey. The Chapel of St. John the Evangelist to Sir Francis Vane, also in the Abbey, shows strongly the Continental influence. This work has been attributed to Nicholas Stone (1586–1647), the first really notable Eng. sculptor. The monument to Sir George Holles in Westminster Abbey is, however, authentic, as is also the statue of Donne in St. Paul's Cathedral. These monuments show that Stone's treatment, if somewhat heavy, was essentially classic. Caius Gabriel Cibber, father of Colley Cibber, and a pupil of Stone, was the sculptor of the fountains and temples of Chatsworth, the famous home of the Devonshire family. Of the Renaissance period, too, was Grinling Gibbons (1648–1720), one of the great names in Eng. sculpture, though perhaps better known for his inimitable wood carving. His figure work is exemplified in St. Paul's Cathedral and other London churches, while the statue of James II. in St. James's Park is one of his best bronzes. Francis Bird (1667–1731) followed the ornate decorative style of Cibber, as in his statue of Queen Anne in St. Paul's Churchyard; but by the beginning of the nineteenth century this style had yielded to pseudo-Gk. purity and achieved little else but cold formalism. No sculptor of distinction emerges in this period, though John Flaxman (1755–1826), the sculptor of the Mansfield monument in Westminster Abbey, Sir Francis Chantrey (1781–1842), and Joseph Nollekens, who executed many good busts, were all well known. The one great figure in Eng. sculpture is Alfred Stevens (1818–75), some of

whose work is not inferior to that of Brunelleschi. His outstanding achievement is the Duke of Wellington's monument in St. Paul's Cathedral, but his decorative work in Dorchester House (now razed) was also brilliant, especially the magnificent fireplace in the dining-room, with its stooping figures of two females in support. (See also under SCULPTURE.)

See G. H. Shepherd, *History of the British School of Painting*, 1881; T. Borenius and E. W. Tristram, *English Medieval Painting*, 1927; C. R. Grundy, *English Art in the Eighteenth Century*, 1928; T. E. Welby, *The Victorian Romantics*, 1929; H. C. Baker and W. G. Constable, *English Painting of the 16th and 17th Centuries*, 1930.

Fletcher, John Gould (b. 1886), American poet, b. at Little Rock, Arkansas, Jan. 3, son of John Gould F. Educated at Phillips Academy, Andover, Mass., and Harvard. Has used his travelling experiences in his verse to good purpose. His sojourns in various parts of Europe and in the western states of America, together with steamboat trips down the Mississippi, extended from 1908 to 1916, when he settled in London, England. Chief publications: *Fire and Wine*, 1913; *The Dominant City*, 1913; *Irradiations—Sand and Spray*, 1915; *Goblins and Pagodas*, 1916; *The Tree of Life*, 1918; and *Japanese Prints*, 1918. Translations: *The Dance over Fire and Water* (by Elie Faure), 1926; *The Reveries of a Solitary* (Rousseau), 1927. Also *Paul Gauguin, His Life and Art*, 1921; *Parables*, 1925; *Branches of Adam*, 1926.

Grant, Duncan James Corrowr (b. 1885), Eng. painter, b. at Rothiemurchus, Inverness, son of Bartle G., major in the 18th Hussars. Educated at St. Paul's School. He is a decorative painter and a painter of landscapes and still life. His early work shows the influence of Cézanne (q.v.). This is evident in *The Tight-rope Walker*. Other works: *The Hammock*; *Pamela Fry*; *Snow Scene*; *Dead Mimosa* and *The Lemon Gatherers*—the last named an early work now in the Tate Gallery. Exhibited in the Independent Gallery, 1921. His work is full of rhythm and decorative in design. One of the greatest living Eng. painters, he has justly acquired a European reputation. See *Duncan Grant in Living Painters*, 1930.

Hodgson, Ralph (b. 1878), Eng. poet and professor of Eng. literature at the Imperial University of Japan. Mingles fantasy and actuality in his songs of innocence and of experience.

A number of his poems are expressions of original happiness contrasted with something like the shock of disillusionment—contrasts not in the way of philosophical opposites, but given as 'poetic apprehensions.' The poem *The Bull* is an illustration, and in this poem, and others like *The Bells of Heaven* and *Stupidity Street*, pity for dumb animals excites an all-too-impotent wrath. He has a peculiar ecstasy of his own, notably exemplified in *The Mystery*, *The Royal Mails* (an original fable), and *The Bells of Heaven*. Some of his lyrics are as fine as any in the language, notably *The Last Blackbird*, which appeared in 1907. His *Poems* were pub. in 1917.

Hopkins, Gerard Manley (1844–1889), Eng. poet and one of the most original of the poets of the second half of the nineteenth century. Educated at Oxford University, and while still an undergraduate there he was received into the Rom. Catholic Church, but, on the advice of Cardinal Newman, he finished his studies at Oxford. He is a poet who must eventually receive his due place in the hierarchy of England's major poets; but it was not until Robert Bridges, the late laureate, edited the first volume of H.'s poems, in 1918, that the literary world realised that in H. it had possessed a great poet whose work in bulk and quality is to be compared with that of Matthew Arnold. The poetry of H., in metrical form and imagery, shows the influence of Keats. This is evident in the beautiful poem *A Vision of the Mermaids* (1862). More mature, but not more inspired than this remarkable effort of his youth, are *Ad Mariam*, in the style of Swinburne; *Winter with the Gulf Stream*; *Lines for a Picture of St. Dorothea*; *Margaret Clitheroe*, and *Wind Lover*. In the development of Eng. poetry his name is of the first importance as that of the poet who broke down the old rhythmic forms, and his literary influence in Eng. verse may be measured by his masterly innovations of rhythm in the language. An excellent analysis of his poetry is to be found in the chapter 'The Craftsman' in G. F. Lahey's *Gerard Manley Hopkins*, 1930. Consult also *Poems*, edited by Robert Bridges (2nd ed.), 1930, with introduction by Charles Williams.

India. The year 1931 was marked by considerable unrest in I. In Bombay, on Jan. 1, the anniversary of the resolution adopted by the Lahore Congress, 1930, demanding the independence of India, arrangements were made by the Congress 'war council' to hold meetings in defiance of authority. Troops and

police were sent to different parts of the city to keep order, and skirmishes took place at night, a number of persons being injured; while the troops were compelled to fire a few rounds over the heads of the crowds. Later in the year there were serious communal riots in Cawnpore, the police force being inadequate to cope with the disturbances. On July 22 an Indian student fired at Sir John Hotson, Acting-Governor of Bombay; a few days later Judge Garlick was shot dead by a young Bengali in his court at Calcutta; while in 1932 the Governor of Bengal was fired at by a girl student, but escaped injury.

The Round Table Conference reassembled in London in Oct. 1931 to discuss the position and functions of the proposed Federal Legislature, the Federal Court, the representation of minorities, the states' places in the legislature, and allied topics. In Nov. the Federal Structure Committee made proposals for the constitution of a federated India, with a scheme for a legislature consisting of an Upper House of 200 members, composed of representatives of the provs. and of the states, 'elder statesmen,' and a small proportion of members appointed by the Viceroy; and a Lower House of 300 members including representatives of the states elected by the free vote of qualified voters from territorial constituencies, and special representatives of the landlord interest, commerce and labour. The Conference, however, broke up without any decision being arrived at of a character to satisfy Gandhi and his adherents. In 1932, owing to threats of further civil disturbances in India, Gandhi and his wife were arrested.

Internal Combustion Engine. See SOLID INJECTION GAS ENGINES; MOTOR BOAT; MOTOR CARS AND MOTOR CYCLES.

Jones, Daniel, Eng. philologist, b. Sept. 12, 1881. Educated Radley, University College School, and King's College, Cambridge. Studied for the law and was called to the Bar in 1907, in which year he also became Lecturer in Phonetics at University College, London University. In 1921 he became Professor of Phonetics at London, and has also lectured at Paris, Bonn, Cologne, Hamburg, Copenhagen, Upsala, Rotterdam, and in the U.S.A. and in India. Works include: *An English Pronouncing Dictionary*, 1898, rev. ed. 1931; *A Chart of English Speech Sounds*, 1908; *The Pronunciation of English*, 2nd. ed. 1913; *An Outline of English Phonetics*, 1918; *The Pronunciation of Russian*, 1923.

Kaiser, Georg, Ger. dramatist, b.

Nov. 25, 1887, at Magdeburg, and educated at the gymnasium there. Began to earn his living at Buenos Aires in an electrical undertaking, but ill-health compelled his return to Germany. His earliest dramatic pieces were farces, but he soon found his true bent lay in serious plays turning on social problems. He is recognised as a disciple of the Expressionist school, dealing with types and making much use of allegory. His work shows the influence of Wedekind. Plays: *Rektor Kleist*, 1905; *Die Jüdische Witwe*, 1911; *König Hammet*, 1912; *Von Morgen bis Mitternacht*, 1916 (Eng. trans. 1920); *Die Sorina*, 1917; *Die Versuchung*, 1917; *Europa*, 1919; *Gas*, 1918 (Eng. trans. 1924); *Der Brand in Opernhaus*, 1918; *Holle, Weg, Erde*, 1919; *Die Flucht nach Venedig*, 1923; *Nebe Konstantin Strobel*, 1925; *Papiermühle*, 1926; *Zweimal Oliver*, 1927.

McEvoy, Ambrose (1878-1927), Eng. painter, son of C. A. McE., a friend of Whistler, who early encouraged his ambition to be an artist. Studied at the Slade School. He began as a painter of restful interiors and poetic landscapes, and then sprang into fame as a fashionable portrait painter, and will probably hold his place among the best Eng. portrait painters. Had little aptitude or inclination for the photographic sense, but rather sought features susceptible of poetic rendering; there is nothing actual or precise in his portraits—they are a paraphrase in terms of beauty, and not a copy of their subject. His water-colours include such landscapes as 'From a Window in Venice' and 'Burton Park'—which reveal the real nature of his talent; and such portraits as 'Lilian,' 'Lady Patricia Ramsay,' 'Miss Tallulah Bankhead,' and 'Miss Zita Yungman'—all poetically treated and with charm of colour and of expression. Other pictures are 'The Engraving,' 'The Thunderstorm,' and 'The Book'—genre subjects in Victorian costume; portraits of sailors and winners of the V.C.—work which dates from his experiences in the R. Naval Division in the Great War; and 'The Ear-ring' (1911), in the Tate Gallery. Examples of his work are also in the Luxembourg Museum and the Municipal Gallery, Johannesburg. Made A.R.A. in 1924. Died Jan. 4.

Macmillan, a well-known Eng. publishing house, founded at Cambridge in 1844 by the brothers Daniel and Alexander M. In 1857 the elder brother died and the business was carried on by Alexander alone. He transferred it to London in 1858, and with the increase of trade, opened a

branch in New York (1869). F. O. Macmillan, a son of Daniel, subsequently became director of Macmillan & Co., Ltd., London, and of Macmillan & Co., New York, and G. A. Macmillan, a son of Alexander, became a member of the firm in 1879. In 1893 the business was converted into a limited liability company and Sir Frederick Macmillan became its chairman. Sir Frederick Macmillan (b. 1851) is the eldest son of Daniel Macmillan (q.v.), and was knighted in 1909. He was also President of the Publishers' Association of Great Britain and Ireland in 1901-02 and 1911-12. In 1901 a publishing centre for India, Burma and Ceylon was started in Bombay. Among the firm's literary undertakings are the Golden Treasury Series, and the Globe editions. See Macmillan and Co.'s *Catalogue*, 1843-89, 1891.

Macmillan, Alexander (1818-96), a founder of the well-known publishing firm of the name, and a publisher of the 'old school,' whose intimate association with the literary men of his time has been made the subject of a memoir. He was of Scottish birth, and after some provincial experience, he opened a publishing business with his brother Daniel, which has now a world-wide reputation.

Macmillan, Daniel (1813-57), the elder brother of the above and senior partner of the business of the name which was afterwards so successfully carried on by Alexander M. He began life as an assistant to a bookseller in Cambridge, in whose house he learnt his trade and acquired a taste for literature. M. combined a keen commercial instinct with a genuine love of books for their own sake. The Macmillans began by specialising in technical and educational works, and the firm still holds important copyrights in books of this class. A great factor in the early success of the business was the publication of Kingsley's works and *Tom Brown's Schooldays*. See Thomas Hughes, *Memoir of Daniel Macmillan*, 1882.

Mansbridge, Albert, Eng. educationist, b. Gloucester, Jan. 10, 1876. Educated at Battersea Grammar School. He was one of the pioneers of adult education (q.v.), founding the Worker's Educational Association in England in 1903 and in Australia in 1913. From 1903 to 1915 he acted as Secretary of the Association. During the Great War he continued his services to education on behalf of the British and Australian armies. He has been a member of various Government Committees on Education, including the Consultative Committee of the Board of Education, 1906-12, and

again in 1924; also a Member of the Royal Commission on the Universities of Oxford and Cambridge, 1919-22. In 1918 he founded the World Association for Adult Education, and was the first Chairman. In 1929 he relinquished his chairmanship and became President. He is also Founder of the National Central Library, the Seafarers' Education Service, and The British Institute of Adult Education. Books include: *An Adventure in Working Class Education*, 1920; *The Older Universities of England*, 1923; *Margaret McMillan, Prophet and Pioneer*, 1931. He was created Companion of Honour in 1931 and holds the honorary degrees of M.A. at Oxford and LL.D. at Cambridge, Manchester, and Pittsburgh.

Matisse, Henri, famous Fr. painter, b. at Le Cateau, Nord, France, Dec. 31, 1869. Left Amiens as a young man to study law in Paris, but soon gave up the idea of a legal career to begin his artistic life as a pupil of Gustave Moreau at the Ecole des Beaux-Arts. Early attracted to the Impressionist movement, his work in 1898 was similar in technique to the *intimiste* paintings of Sickert and Bonnard. Thenceforward, however, he came completely under the influence of Gauguin, and was soon to become one of the foremost leaders of the Fauvistes. A better draughtsman than Gauguin, M. has much in common with Eastern painting, and his clear washes or planes of pure colour, as opposed to the mosaic method, achieve the maximum of expression with an astonishing economy of means. In their emphasis on linear design, many of his pictures are masterly in their summary expression of form and rhythm. Pictures like 'The Dance'—consisting of brick-red dancing figures in the nude against a background of raw blue and green—if anarchic in conception, are essentially expressive of life and movement; and the same observation applies even to those of his paintings such as 'The Toilet,' where there is undoubtedly some distortion of form. Consult E. Faure, *Henri Matisse*, 1920; A. Basler, *Henri Matisse*, 1924; Frank Rutter, *Evolution in Modern Art*, 1925.

Meninsky, Bernard, Eng. painter, b. in Russia, July 25, 1891. Studied at the Slade School, London, and also in Liverpool and Paris. Has exhibited at various international exhibitions. The Tate Gallery has his 'Portrait of a Boy' and the Dublin Art Gallery his 'Mother and Child.' He was one of the British official artists in the Great War. He is now teacher of drawing and painting at

the Central School of Arts and Crafts and at Westminster School.

Merrill, Stuart (1863-1915), one of the two Americans who have won celebrity as Fr. poets, was b. at Hempstead, Long Island, New York. His infancy was passed in Paris, where he studied at the Lycée Condorcet, returning to the U.S.A. to study law at Columbia University, a study which he soon abandoned in order to devote himself to literature. While still in the U.S.A. he pub. his famous *Pastels in Prose*, consisting of translations from some thirteen Fr. writers then only known as names in America. Returning definitely and finally to France in 1890, he became well known as a master of the intricacies of Fr. poetry. In 1897 he pub. a collection of his poems up to that date and followed this with several other volumes.

Montague, Charles Edward (1867-1928), Eng. author, b. Jan. 1. Educated at City of London School and Oxford University. His novels are of considerable merit, and among his other writings *Dramatic Values* (1911) contains excellent comments on the tendencies of nineteenth-century drama. Pub. works: *A Hind Let Loose*, 1910; *The Morning's War*, 1913; *Disenchantment*, 1922; *Fiery Particles*, 1923; *The Right Place*, 1924; *Rough Justice*, 1926; *Right off the Map*, 1927; *Action* (stories), 1928; *A Writer's Notes on his Trade* (pub. posthumously), 1930. Some of these are based on his experiences in the Great War on active service, *Disenchantment* being one of the sanest books occasioned by the War. M. was a governor of the Manchester University and a director of the *Manchester Guardian*. See O. Elton, *C. E. Montague*, 1929.

Moore, Thomas Sturge (b. 1870), Eng. poet and wood engraver, b. March 4. Publications: Poetry, *The Vinedresser and other Poems*, 1899; *Aphrodite and Artemis*, 1901; *The Little School*, 1905 (enlarged 1917); *Tragic Mothers*, 1920. Prose, *Correggio*, 1906; *Art and Life*, 1910; *Some Soldier Poets*, 1919; *Why Beautiful?* 1926; *Armour for Aphrodite*, 1929; *Mystery and Tragedy*, two dramatic poems, 1930.

More, Paul Elmer, American author and editor, b. at St. Louis, Dec. 12, 1864. Educated at Washington University and at Harvard. Was assistant for Sanskrit at Harvard, 1894-95; associate for Sanskrit and classical literature at Harvard and Bryn Mawr College, 1895-97. Literary editor of *The Independent*, 1901-03, and of the *New York Evening Post*, 1903-09; editor of *The Nation*, 1909-

14. Publications: *Shelburne Essays*, 1904; *Life of Benjamin Franklin*, 1908; *Platonism*, 1917 and 1927; *The Religion of Plato*, 1921, and *Hellenistic Philosophers*, 1923.

Mottram, Ralph Hale, Eng. novelist, b. at Norwich, Oct. 30, 1883. Educated in Norwich and London. Employed in Barclay's Bank and then served on the Western Front. His war experiences in Belgium inspired the admirable novel or quasi-novel entitled *The Spanish Farm* (1924), the chief female character in which may be said to personify Belgium through the ages. *Sixty-Four*, *Ninety-Four*, and *The Crime at Vanderlynden's* combine with *The Spanish Farm* to form a trilogy. Other books are *Our Mr. Dornier*, 1927; *The English Miss*, 1928; *Ten Years Ago*, 1928; *The Boroughmonger*, 1929; *A History of Financial Speculation*, 1929; *Europa's Beast*, 1930; *Poems Old and New*, 1930; *Castle Island*, 1931; *Home for the Holidays*, 1932.

Nares, Sir George Strong (1831-1915), Scottish admiral and explorer, b. in Aberdeen, April 24. In 1852, was in Sir Edward Belcher's expedition in search of Sir John Franklin. In 1867 he was captain of H.M.S. *Challenger*, the first steamship to cross the Antarctic Circle. From dredging operations, it was inferred that there was a continent in the far S. In 1875 N. led an expedition to reach the N. Pole, reaching Grant Land, 81° 44' N. lat. Sir Albert Markham in the *Alert*, one of the boats of this expedition, reached 83° 2' N. Did valuable hydrographical work on Mediterranean currents and on the equatorial current. Awarded Founder's Medal, Royal Geographical Society, 1877, and Gold Medal, Geographical Society, Paris, 1874. Pub. several works on his explorations.

Nash, John Northcote (b. 1893), Eng. artist, second son of W. H. Nash. Educated at Wellington College and joined Artists' Rifles in 1916. Served in France 1916-18, and was commissioned to paint war pictures for Imperial War Museum. It is as an illustrator and wood-engraver that he is chiefly known. See his *Poisonous Plants*, engraved in wood, 1927, and his illustrated editions of Swift's *Directions to Servants* (1925), Ovid's *Elegies* (1925), Spenser's *Shepherd's Calendar* (1930), and others. See also *John Nash in British Artists of To-day Series*, 1925.

Nash, Paul (b. 1889) Eng. painter, engraver, and theatrical designer, b. in London, May 11, eldest son of W. H. Nash, Recorder of Abingdon. Educated at St. Paul's School and the Slade School. In 1917 he was one of the official artists on the Western

Front. His work was exhibited at the Leicester Galleries in 1918 and in 1924. A painter of the Post-Impressionist school. With his brother John and Ethelbert White, his style represents the flat definition in the Eng. Post-Impressionist movement. Though taught at the Slade School, he has little in common with the orthodoxy of that institution. It was in 1911-12 that his water-colours began to attract attention at the New English Art Club, paintings which 'revealed an extraordinary innocence of vision and a sense of delight and wonderment in all seen and painted.' His war pictures, poignant expression in art of the emotions of broken soldiers, won instant popularity. One of the most striking is his 'Inverness Copse.' Publications: *Places, Prose Poems and Wood Engravings*, 1922; and *Monographs in British Artists of To-day Series*, 1927.

Nevinson, Christopher Richard Wynne (b. 1889), Eng. painter, etcher and lithographer, b. in London, son of Henry Wood N., journalist and traveller. Studied art at St. John's School of Art, the Slade School, and in Paris. Became known for war paintings, his first exhibition of these being in 1916. In 1917 he was appointed an official war artist, and some of his war pictures were bought by the Imperial War Museum and the Canadian War Memorials Fund. He is especially happy with effects dependent upon a new angle of vision, or upon peculiar conditions of light, as e.g. in his 'Night Drive'—a motor-car study; and 'From a Paris Plane'—bird's-eye view of a Channel port from an aeroplane. His topographical works show an intuitive response to the spirit of the place chosen, as in his 'London Winter'—a picture of barges, cranes, and gulls, in which movement and atmosphere are the essence of the subject. Among his best works are 'The New Forest' and 'Autumn Sunshine,' both of which give the effect of depth. His etchings include 'Manor Gates,' 'Looking through Brooklyn Bridge,' 'Cornish Landscape,' 'Ebb Tide, Rye,' 'Barmouth Estuary,' 'Steam and Steel,' and 'The King is Dead' (a pastel head). Some of these have been bought by the British Museum, Birmingham and other city art galleries, Harvard University, etc.

O.G.P.U., the Soviet State Political Department, once called the Tcheka, which is designed to combat political and economic counter-revolution, espionage and brigandage in Russia, and indeed, through propaganda and money, elsewhere. The chairman is

a member of the Council of People's Commissaries of the Union. The legality of the acts of the O.G.P.U. is controlled by the Attorney-General of the Soviet under a decree of the 'Tsik' or Central Executive Committee of the Union.

Ottawa Conference, an imperial economic conference of the British Commonwealth of Nations, which is to meet at Ottawa in July 1932. The fundamental purpose of the Conference is to arrive at mutually advantageous trading agreements and also to discuss such ancillary problems as currency stabilisation, oversea settlement, etc.

Owen, Wilfrid (1893-1918), Eng. poet, b. at Oswestry, March 18. Educated at the Birkenhead Institute and at London University. Was a private tutor till 1915 at Bordeaux, where he met Laurent Tailhade, the Fr. poet. He then served on the Western Front with the Manchester Regiment; was wounded, but, after convalescence in England, returned to France, and was killed on Nov. 4, 1918, at the Sambre Canal. His work shatters the illusion of the glory of war, and, by a rare mastery of the association of words, he brings home to us both the hollowness and wreckage of war and the tender loveliness it has ruined. In technique his work shows one remarkable feature—a peculiar type of rhyme used to enhance the expression of feeling. In these experiments in assonance and dissonance—well exemplified in *Strange Meeting*—he substitutes for vowel identity a consonantal identity, and he wrote one poem in which all the lines ended in such rhymes as 'escaped,' and 'scooped.' There is a deep humanity of self-revelation in such poems as *Greater Love* and *Apologia pro Poemata Meo*, and if some of the lines in his poems are ugly, the ugliness is designed, and often enhances the emotions of disgust and weariness of illusion and the effectiveness of the stark realities he felt with such intensity. See *The Poems of Wilfrid Owen*, ed. by Siegfried Sassoon, 1921, and *The Poems of Wilfrid Owen*, edited with memoir by Edmund Blunden, 1931.

Pagenstecher, Hermann (1844-1932), famous Ger. ophthalmologist, b. at Langenschwalbach, Sept. 16, brother of Alexander P. (1828-79), founder of the Wiesbaden Eye Hospital (1857). Educated at Wiesbaden and at the universities of Würzburg, Berlin and Prague. In 1868 was assistant at the University Hospital of Greifswald, and in 1869 at the Wiesbaden Eye Hospital. At his clinic in the Taunusstrasse he

received patients from all over the world, effecting many remarkable cures. Queen Victoria, the Empress Frederick and many other Royal persons were among his patients, but he made no distinction between the rich and eminent and the poorest patient, treating all alike, with the same degree of skill and care. Wrote many essays on professional subjects, his *Atlas of the Pathological Anatomy of the Eye* being the best known. Died April 12.

Saorstatt Eireann, the Gaelic name for the Irish Free State (*q.v.*).

Selfridge, Harry Gordon, American business man, b. Ripon, Wis., U.S.A. From 1890 to 1903 he was a member of the firm of Marshall Field & Co. of Chicago. Coming to London three years later, he established the house of Gordon Selfridge and Co., which has become one of the largest general stores in England. In 1917 he published a book, *The Romance of Commerce*.

Söderblom, Nathan, Archbishop of Upsala, Pro-Chancellor of Upsala University and Primate of Sweden, was b. at Helsingland, Sweden, Jan. 15, 1866, and d. at Upsala, July 11, 1931. Educated at Upsala, at the age of twenty-eight he was appointed rector of the Swedish church in Paris. In 1901 he returned to Upsala as professor, and was made Archbishop in 1914 after two years as professor at Leipzig University. He became famous as a writer on historical and theological subjects, particularly his *Religious Culture and General History of Religion*. He was one of the foremost advocates of the unity of the Christian Churches. The Lambeth Conference of 1920 gave the recognition, which he had sought, of special relations between the Swedish church and the Anglican Communion. His next task was to bring about the Oecumenical Church Congress, which was held at Stockholm with the co-operation of the Archbishop of

Canterbury. In 1926 he was honoured with an invitation to preach in Canterbury Cathedral. The same year he delivered a course of lectures at Trinity College, Dublin. Both Glasgow and Oxford Universities conferred degrees on him. He also did much to try to promote international understanding and the ensuring of peace and for this was awarded the Nobel Peace Prize for 1930.

Sydney, the great bridge linking the N. and S. sides of Sydney Harbour, was opened on March 19, 1932. It is the largest single-span bridge in the world, the main span being 1650 ft. long and the top 75 ft. higher above water than the cross of St. Paul's Cathedral. It has four railway tracks, a roadway that will accommodate six lines of traffic and two 10 ft. pathways. The total cost, including the price of the land purchased, was £10,000,000. The bridge was designed by Mr. R. Freeman, and the specifications were prepared by Dr. J. J. Bradfield, State Engineer in New South Wales.

Tcheka, the old name for the Soviet State Political Department, but, since 1922, known as the O.G.P.U. (*q.v.*, and see also RUSSIA).

Vielé-Griffin, Francis, sometimes called the greatest American poet who ever wrote in the Fr. language, was b. in Norfolk, Virginia, U.S.A., May 26, 1864. His father was a general in the Union armies which invaded the South. But if he was American by birth, he was really Fr. by blood. His paternal ancestors came to America from Lyons. His mother's family came from Touraine. He came to France in his youth and settled there for good. An early member of the symbolist school of poetry, he is one of the founders of free verse, and still one of its best exponents. He has written many small volumes of verse, which were issued in a definitive edition in three volumes 1924-27.

